

Perceptions and Applications of Honors Contracts in Developing an Undergraduate Engineering Research Experience

Dr. Yanjun Yan, Western Carolina University

Yanjun Yan received her B.S. and M.S. degrees in Electrical Engineering from Harbin Institute of Technology (China), and the M.S. degree in Applied Statistics and the Ph.D. degree in Electrical Engineering from Syracuse University. She is an assistant professor in engineering and technology at Western Carolina University. Her research interests are statistical signal processing, diagnostics, and particle swarm optimization.

Prof. Sudhir Kaul, Western Carolina University

Dr. Kaul is an Assistant Professor of Mechanical Engineering at Western Carolina University. His research interests include Fracture Diagnostics, Structural Dynamics and Control, and Motorcycle Dynamics.

Dr. Chip W. Ferguson, Western Carolina University

Chip Ferguson is the Associate Dean of the Kimmel School and Associate Professor of Engineering and Technology at Western Carolina University.

Dr. Paul M. Yanik, Western Carolina University

Dr. Paul Yanik is an Assistant Professor of Electrical and Computer Engineering Technology at Western Carolina University. His research interests include human-robot interactions, assistive devices, pattern recognition, machine learning, and engineering education.

Dr. April Tallant, Western Carolina University

April Tallant, PhD, RD, LDN is from western North Carolina. She earned a Bachelor of Science and a Master of Health Sciences from Western Carolina University (WCU). She completed her PhD at the University of Tennessee, Knoxville. She served as assistant professor for the School of Health Sciences at WCU for several years. She is currently the Associate Dean of The Honors College at WCU where she coordinates undergraduate research. Dr. Tallant is the recipient of the 2008 WCU Excellence in Teaching Liberal Studies Award and the 2012 WCU Scholarship of Teaching and Learning Award. She enjoys teaching transition courses and first year seminars, studying about food access in rural areas, and engaging in the scholarship of teaching and learning.

Perceptions and Applications of Honors Contracts in Developing an Undergraduate Engineering Research Experience

Abstract: Honors colleges have become very effective in attracting and recruiting highly motivated and talented students to institutions of higher education ^[1, 2]. The Honors Path allows students to earn an Honors Diploma and provides them with unique educational opportunities, which facilitates strong personal and academic growth ^[1]. At Western Carolina University (WCU), two ways to earn Honors credit include taking an honors course (often a general education course) or to fulfill an Honors contract through a required major course in order to complete the 24 credit hours required to receive the Honors Diploma ^[3]. With engineering curriculum requiring 17-18 credit hours per semester, engineering students have little to no capacity for completing the Honors Path through extra course work and typically couple Honors contract projects with their engineering courses. Honors contract projects are mentored by sponsoring faculty mentors and are closely related to the faculty members' engineering practice and/or research efforts. The Honors contract projects are often (although optionally) presented orally to the entire class, which is not only beneficial to the students who conduct them, but also inspirational for their classmates. More importantly, these contracts can be a part of a research project to help advance the faculty member's scholarship, or a response to industry or community needs, which help solve real-world problems ^[4]. Benefits of Honors contracts to the student include working closely with a faculty mentor, tailoring their education based on their interests and take a greater responsibility in their education ^[5]. The impact of the Honors contracts in undergraduate engineering research at WCU has been far-reaching and significant.

In this paper, the motivations, practices, and impact of the Honors contracts are examined. Student perceptions and the applications of Honors contracts, in developing an undergraduate engineering research experience, is thoroughly analyzed. Several past projects in electrical engineering, engineering-mechanical, and engineering technology programs are presented, which were developed from the students' daily life, research needs, and industry/community needs. Honors projects that integrate multiple contracts and courses across the curriculum and grade levels are discussed. Suggestions for improving the Honors contracts pathway are also presented. This paper aims to serve as a reference to inspire more ideas from the faculty who have mentored honors students.

Background

Honors Programs and Honors Colleges are similar in that they require an honors curriculum or educational frameworks where students need to satisfy requirements in order to graduate with an Honors degree or designated Honors mark on their diploma; the intent being to engage and challenge students ^[6]. Although there is no universal minimum requirement in the Honors Programs or Honors Colleges, a common trait is that the students are encouraged to experiment with things that are beyond the regular course level, and students need to maintain certain GPA. The honors curriculum provides an encouraging learning environment for a student to reach their full potential, and in general Honors Programs and Honors Colleges have been effective in recruiting the most talented students. Honors Colleges are relatively new in comparison with Honor Programs, and Honors Colleges are often developed from Honors Programs. Students

may not find too much difference between an Honors Program and an Honors College, but an Honors College with a designated dean helps to represent the Honors College at the university level in administration. An Honors College student enjoys the learning atmosphere similar to that at a liberal arts college while being able to take advantage of the resources at a comprehensive university.

At WCU, the Honors College was established in 1997, the first in the state's public university system. To graduate with an Honors diploma, students must meet GPA benchmarks and finish 24 Honors credit hours. The Honors credit hours can be earned through an Honors course, through an Honors contract in any course of their choosing, where students are mentored by the instructor, or through an approved study abroad experience. Given the 24 required credit hours, if a student comes in as a freshman, s/he can finish 3 Honors credit hours per semester (required to maintain Honors College good standing) and graduate in 4 years (or 8 semesters) with an Honors diploma. However, if a student transfers in at practically the sophomore level, s/he has to double up on his/her Honors course or Honors contract in two semesters, which can be challenging and time-consuming. Practically, it is not recommended for juniors or seniors to consider Honors College, if they are not already in the Honors College.

Although the 24 Honors credit hours can be earned through either Honors courses or Honors contracts, the engineering and technology students have little to no capacity for completing the Honors Path through extra course work and typically couple Honors contract projects with their engineering courses. The Honors College students are expected to fulfill all the requirements of the regular course, and then conduct an independent Honors contract mentored by the course instructor. The Honors contract is proposed in the 5th week of the semester, and it needs to be approved by both the instructor and the dean of the Honors College. The deliverables of the Honors contracts are due on the Friday in the 16th week before the finals.

The authors of this paper in the Engineering and Technology department have mentored many Honors contracts, and yet we have not discussed them until recently. Through discussion, we have found many common traits and identified some best practices that we could attempt. The discussion was extended to a broader group by surveying other faculty members and students on their experiences with the Honors contracts. Most of what we found is aligned with our pre-conceptions based on our own experiences, and the results may serve as an inspiration for new ideas for Honors contracts in other universities. However, we find mostly consistent, but sometimes inconsistent opinions between the faculty and students. These inconsistencies are valuable for us to understand our students better.

The rest of the paper is organized as follows. We will first explain the survey protocol. Each question in the survey is presented in two versions (one for faculty and one for students), and the full question statements and answer choices are listed in Appendix 2. In Appendix 1, some guideline on "good" or "bad" Honors contracts are presented. In Appendix 2, the number of votes is listed on the left hand side of each choice item. Then the total votes for each choice item are tallied from both the faculty and the students. The tallied results are converted to percentages and presented in a bar chart in the main body of the paper. The bar chart provides an immediate visual comparison but the choice items are shortened due to lack of space in a chart. Lastly the

key findings are summarized, and some recommendations on practices associated with Honors contracts are made.

Faculty and Student Survey Protocol

We used Qualtrics to conduct the surveys, the surveys were anonymous and voluntary. We created two copies of the surveys with similar questions: one to gather the perspective of the faculty mentors that was sent to the faculty, and the other to understand the perspective of the students and sent to the students whose GPA is above 3.25 (At WCU, the Honors College requires a minimum GPA of 3.5, and we set the survey criteria to be $GPA > 3.25$ so that this survey is also a tool to inform the prospective students about the Honors College).

We received 9 responses from the 19 faculty members (47.4% response rate) and 25 responses from the 180 students (13.9% response rate). All the participating faculty members answered that they have mentored Honors contracts. Out of the 25 student participants, 10 students are enrolled in Honors College, but one of these students had not signed up an Honors contract at the time of the survey (possibly a freshman). Only these 10 students are prompted to answer questions about the Honors contracts based on their experiences or perceptions. In the results presented in the rest of this paper, the response rates are presented in percentages for readers' easy comparison. However, given the small sample size (9 faculty members and 10 students), a percentage change of 11% for faculty or 10% for students differs by only one response. These percentages do not imply statistical significance.

In our department at WCU, we are implementing an NSF sponsored scholarship program, the SPIRIT program (Scholarship Program Initiative via Recruitment, Innovation and Transformation), which considers both academic merit and financial needs. One of the SPIRIT program enrollment requirements is that the student's GPA is 3.25 or above. Out of the 10 Honors College students, 3 are in the SPIRIT program. Out of the 15 non-Honors College students, 3 are in the SPIRIT program, and 4 are interested in applying to the Honors College. This ratio, although far from statistically significant due to the small sample size, implies that the students are interested in Honors College if they are eligible.

Motivations for Students to Sign up a Particular Honors Contract

The questionnaires for faculty and students were sent out separately, but the answer choices are similar and in the same order. The complete list of questions and answer choices are listed in Appendix 2. In Appendix 2, the number on the left hand side of the answer choice item is the number of votes for each response. If some participants filled in the "Other, please specify" field, those responses are underscored and numbered in the order that they were received. In the main body of this paper, bar charts are used to represent the aggregated results, where the choice item is shortened to be a word or a phrase, and the counting is converted to percentage. Although the percentage is helpful for a reader to see the relative preference, it should be noted that the sample size is pretty small at this stage. The bar chart illustrates exactly the same information as in the response counting from both the faculty and the students in Appendix 2. This format is being used throughout this paper.

As shown in Fig. 1, the largest proportion of reasons to do an Honors contract in a course was student interest in a course (100%), followed by their liking of a particular instructor (60%). This is what we are very glad to discover, and we, as faculty members, can encourage our students to carry out Honors contracts under our supervision, and enable them gain a special experience. In many cases, students are very self-motivated if they have already decided on a topic.

Earning 24 Honors credit hours toward the Honors diploma can be very difficult for students with a limited number of semesters on campus such as transfer students. This results in “doubling-up” multiple contracts during a single semester. If they happen to not like an Honors contract in any class in that semester, they may still choose to do one, then they might be less motivated. Since there is no penalty in not completing a contract (other than not earning the Honors credit hours), students can sign up for multiple Honors contracts at the beginning of a semester, in essence creating “backups”, in case they do not do well in another contract course. As long as they finish one of those contracts, they would have gained enough Honors credit in that semester. This maneuver might give students the peace of mind, but such a mentality might also hinder their progress in either Honors contract. We understand why it happens, but as engineering faculty, we hope to discourage this practice.

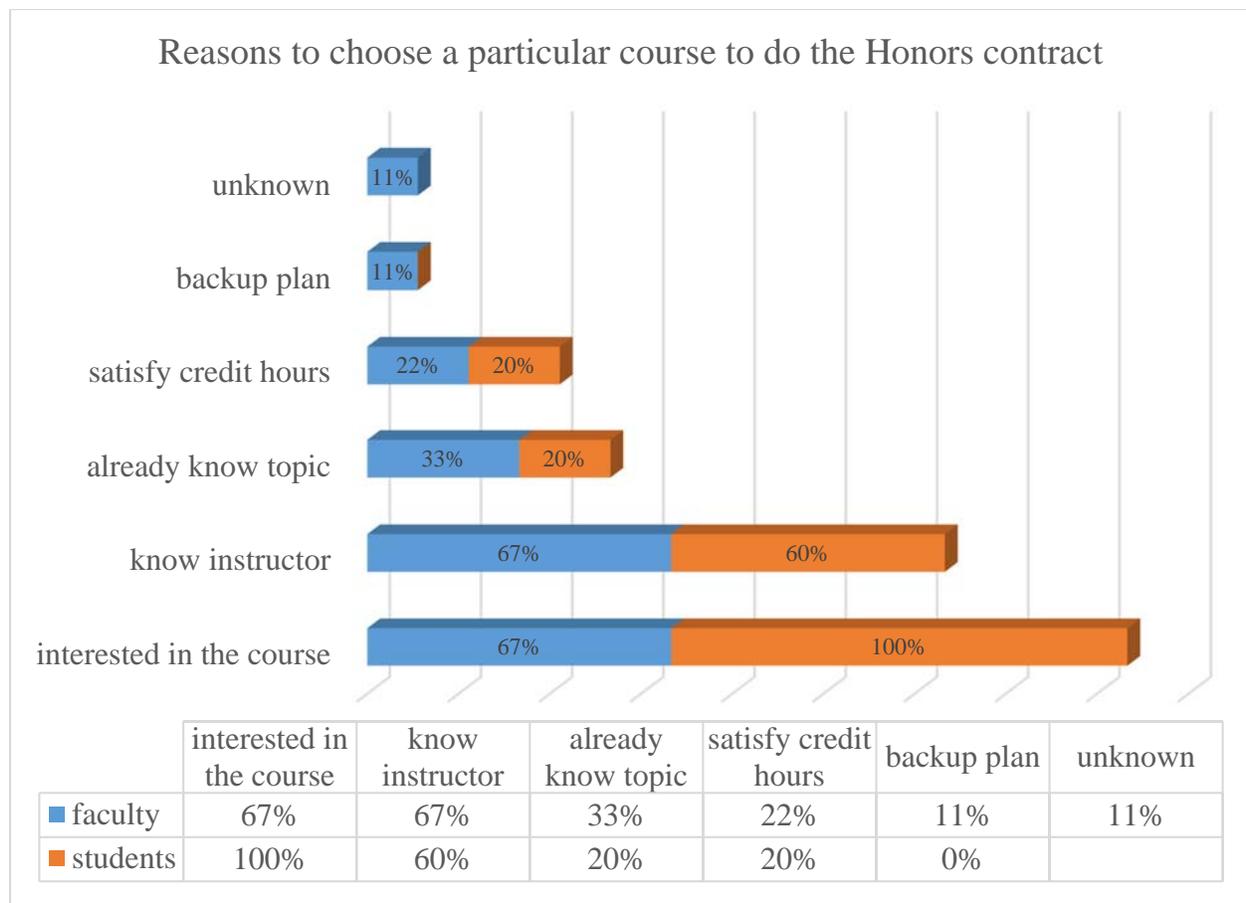


Fig. 1 Response – reasons for choosing to do an Honors contract in a particular course.

Expected Deliverables of the Honors Contract

For the results in this section, the participants were asked to provide their perceptions of the expected deliverables of the Honors contracts. Even if they might not have utilized a particular form of deliverable, they could still judge that form as mandatory or optional. The expected deliverables of an Honors contracts are most often in the form of a prototype, a program, or a circuit, depending on the nature of the course. As shown in Fig. 2, a written report is a valuable record of what the student has accomplished. A presentation in class is also a popular choice.

Given the three most common choices in deliverables, as faculty, we were curious to see if Honors contracts should be designed with mandatory or optional deliverable formats. A breakdown on whether it should be mandatory or optional is shown in Fig. 3. As to the mandatory items, a prototype, a circuit or a program is almost expected to be a given by all the faculty members (100%) and most students (80%). The written report is preferred more by the faculty members (78%) than the students (40%), while a presentation in class is preferred more by the students (40%) than the faculty members (11%). The faculty members expect the in-class presentations to be mostly optional (56%), but the prototype and written report should be mostly mandatory (100% and 78%, respectively). On the other hand, 20% of the students think that the prototype can be optional, and 30% of students think that both the written report and the presentation in class can be optional.

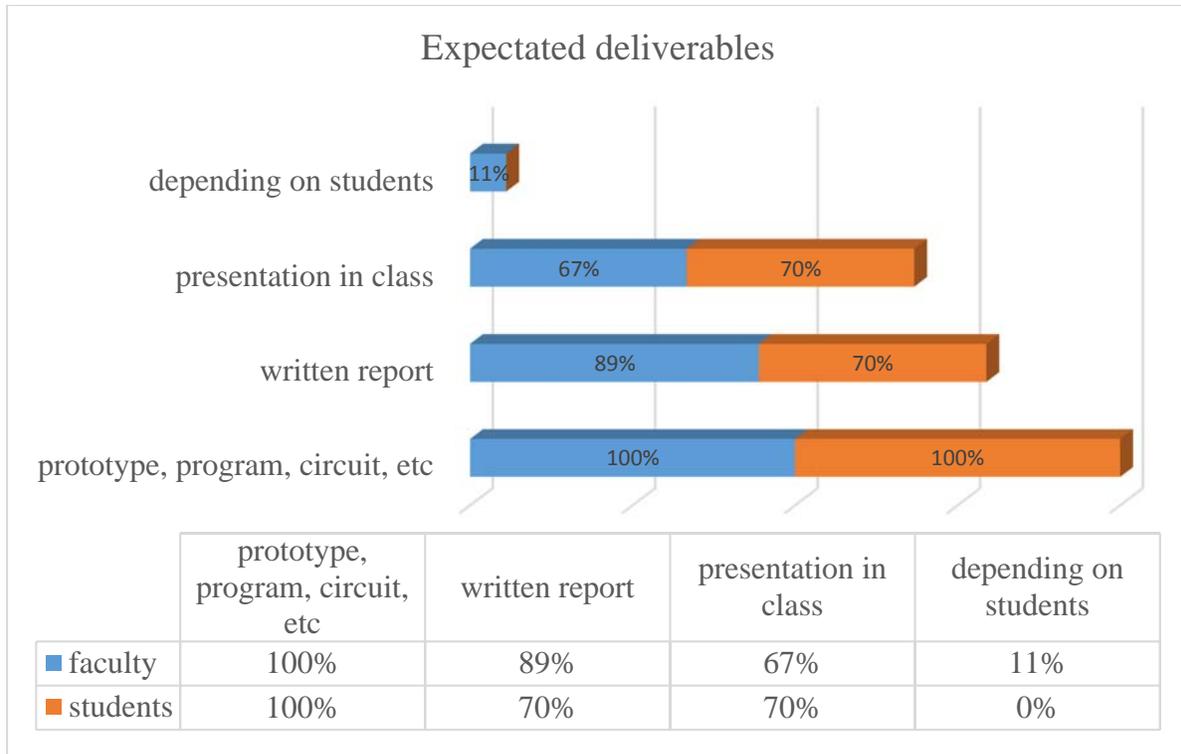


Fig. 2 Expected deliverables.

As one faculty member points out, the deliverable should depend on the students, namely, their particular projects in certain courses. Depending on the nature of the course and the project, we can adjust our expectations and requirements. Also, if one has never tried any of the proposed deliverables, it would be fun to try. For instance, if a faculty member has never asked the Honors

College student to present to his/her peers in the class, then s/he may consider this option, which might help the Honors College student to learn oral presentation skills, to share his/her excitement, and to help his/her peers to see what could be done in their class.

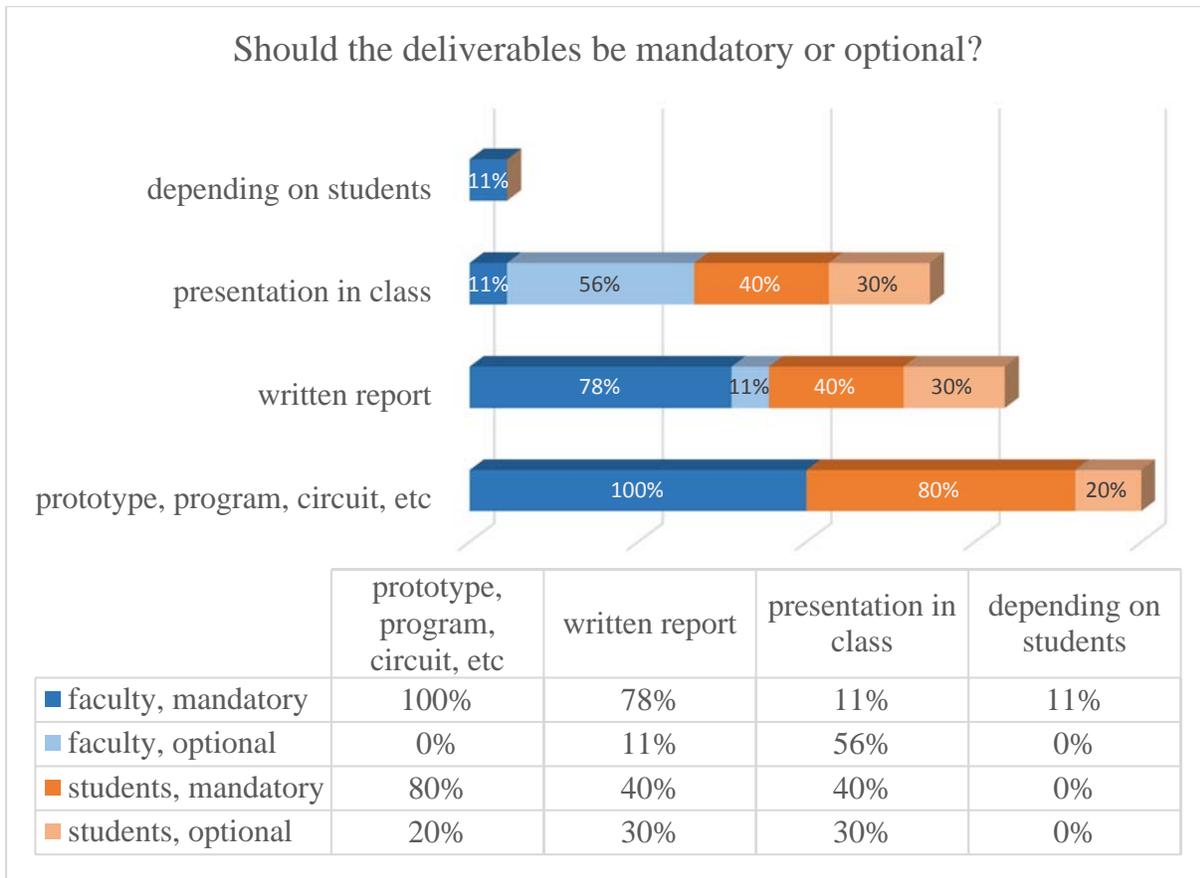


Fig. 3 Deliverables – mandatory or optional.

Expected Outcomes or Impact of Honors Contracts

In this section, the faculty and student perceptions are not as consistent as in other sections, in the categories of mentorship fostering, student self-confidence and oral presentation skills.

- 89% of the faculty members feel that the mentorship relationship is fostered through Honors contracts, and 60% of the students feel so.
- 89% of the faculty members feel that the students have gained more self-confidence, but only 30% of the students feel so.
- Only 33% of the faculty members feel that the students could gain oral presentation skills, but 70% of the students feel that they could.

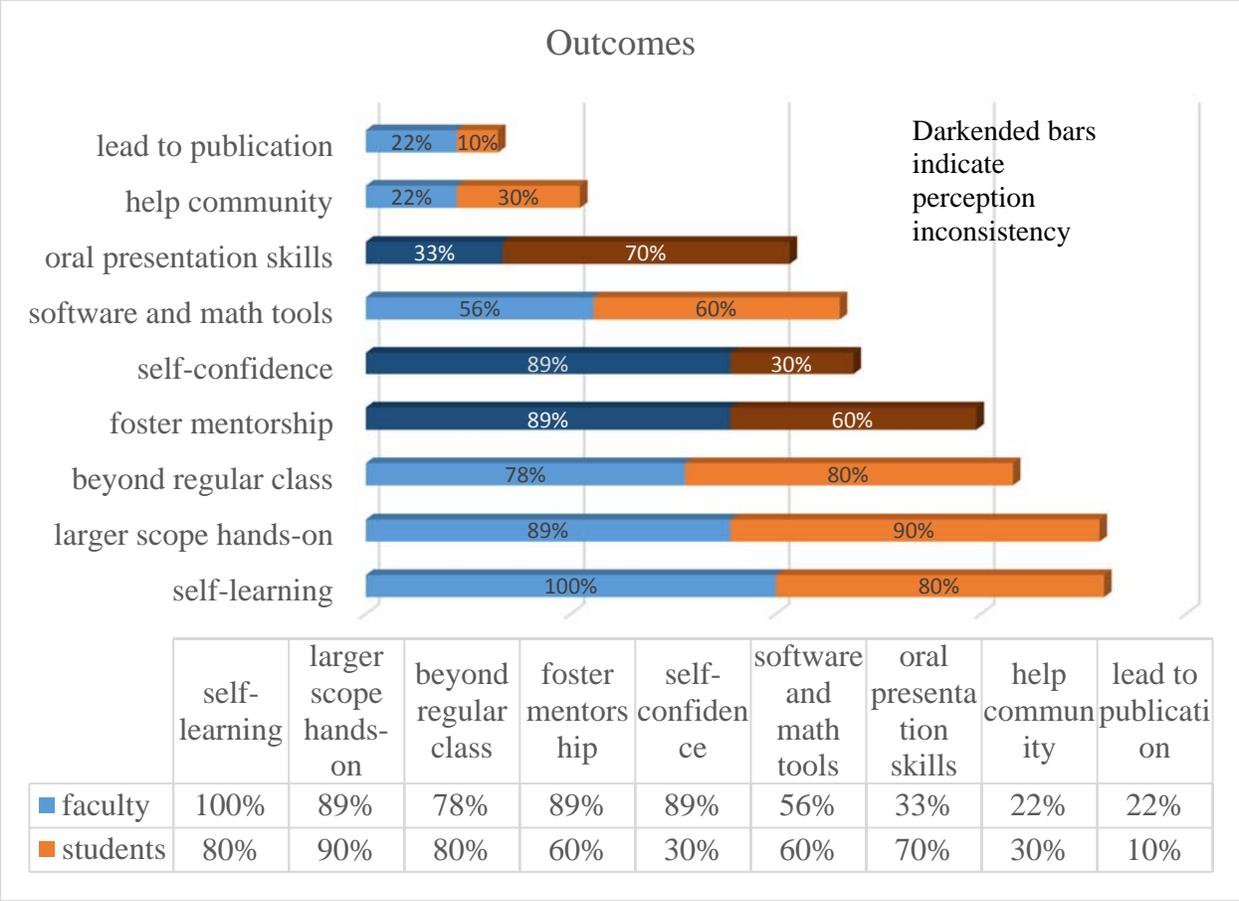


Fig. 4 Outcomes.

There are some positive effects of Honors contracts that are viewed consistently between faculty and students. For example, the Honors contracts can help students gain self-learning skills (faculty 100%, students 80%), to gain hands-on experiences in a larger scope than the courses (faculty 89%, students 90%), to learn new software and/or mathematics tools (faculty 56%, students 60%), to help the community (faculty 22%, students 30%), and to lead to publications (faculty 22%, students 10%).

Some effects are more dominant (self-learning, hands-on, etc) than others (community help, publications), but if out of 10 Honors contracts, some community service can be carried out, or 1 or 2 publications can be rendered, it is still a marvelous achievement. The faculty can have this in mind while designing an Honors contract.

The darkened bars in Fig. 4 indicate inconsistency between faculty and students’ perceptions.

- Most faculty members (89%) tend to think that they are fostering a mentorship relationship with the students whom they mentored to do the Honors contracts, but fewer percentage of students (60%) feel that way. This is perhaps because the students still regard the Honors contract mentor as the instructor of the course, and they might not have the same instructor for another Honors contract. However, the faculty members are already willing to mentor the students, and we could advise the students that the long-

term relationship that lasts beyond the Honors contracts could help them in all aspects of their lives in college. Also, if they perform well in an Honors contract, the mentor could write a strong recommendation letter, more substantial than the one from a regular instructor of a course, to help them advance in their careers.

- Most faculty members (89%) think that the students will gain more self-confidence after they finish their Honors contracts, but very few students (only 30%) feel this way. This is alarming. To carry out an Honors contract, the students will be required to go beyond the regular scope of the course, but the mentors have detailed instructions and often arrange weekly meeting with the Honors contracts students to help them along the way. We do want to let the students see that they are not alone in this, and we have confidence in them that they are capable to carry out the Honors contracts. We do not want them to feel intimidated or incapable in any way. This is something we, as instructors, should have stressed more to get the message across. We all want our students to be successful in whatever their endeavors are.
- Regarding oral presentation skills, not many faculty members (33%) think that an Honors contract could help the students to gain the skills, but more students (70%) think that it could. This topic is related to the deliverables that an Honors contract student should achieve. Some faculty members encourage the students to make a presentation in front of his/her classmates as an optional exercise, and hence the students can gain some experiences in oral presentation, as well as sharing what s/he has done in the Honors contracts. Some students may not choose this oral presentation option, despite the mentor's encouragement, that is fine, too, but they might have seen the potential that it could be done. Optional oral presentation of an Honors contract is something that all faculty members could consider.

Effects of Honors Contracts on Their Regular Classmates

Most participants (faculty and Honors College students alike) consider Honors contracts more beneficial than harmful or no effect to the other students in the class, which is illustrated in Fig. 5. The student cohort can be a great motivation for everyone to try things that they have never done before. Earning credit hours is one thing, but the joy in learning and doing is what drives one move forward in life.

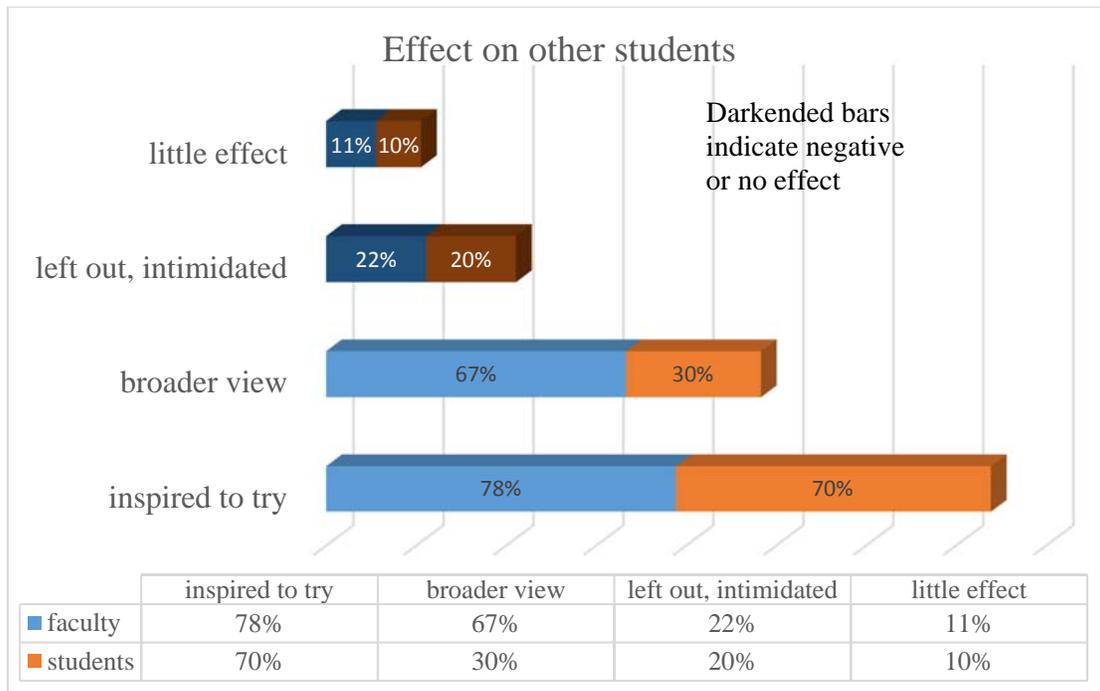


Fig. 5 Effects on classmates.

Multiple Honors Contracts in a Sequence of Courses, Either Taught by a Single Instructor, or by a Group of Coordinated Instructors.

The practice of having multiple Honors contracts in a sequence of courses is rare. Only 11% of the faculty members have done this, and none of the 10 Honors College students has done this. However, this practice can be extremely beneficial, although challenging. The participants have shared their perceptions of the advantages of such a practice in Fig. 6.

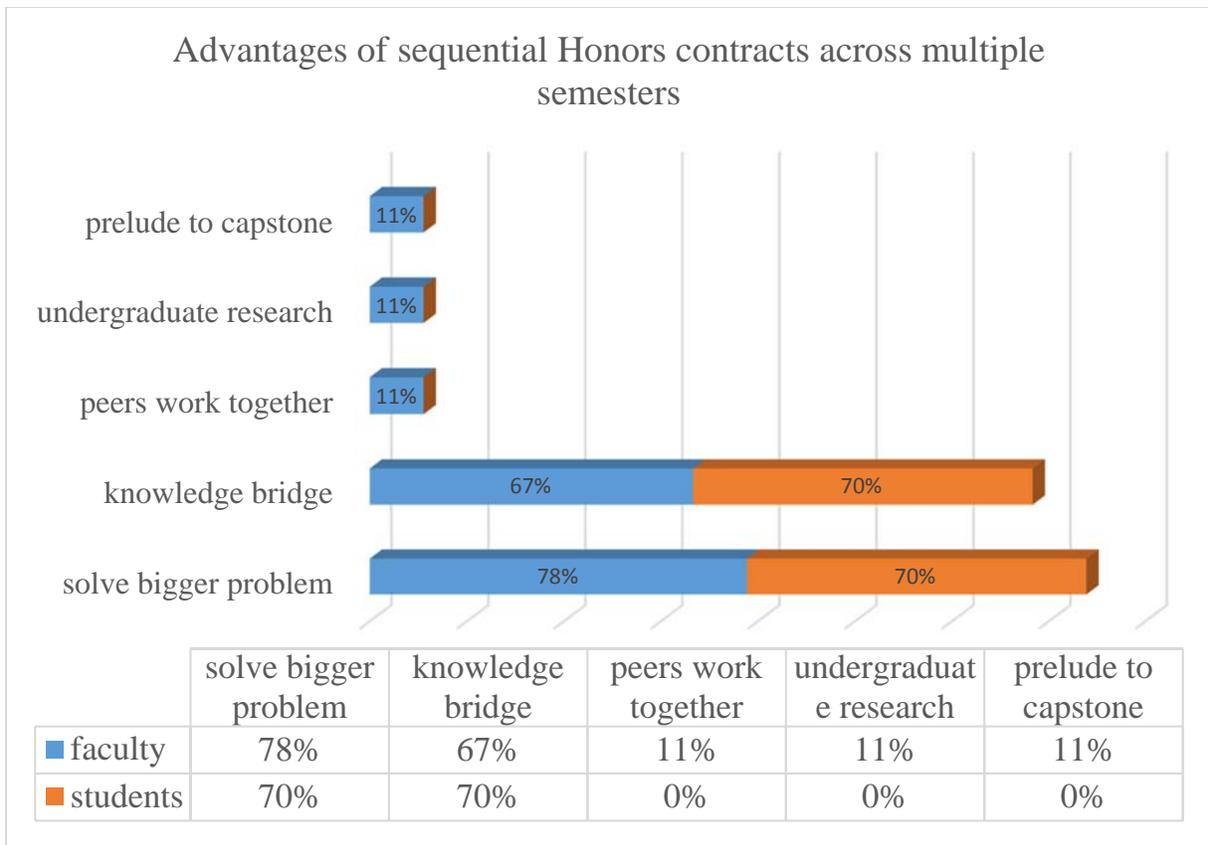


Fig. 6 Advantages of sequential Honors contracts.

Regarding the disadvantages or challenges to implement sequential Honors contracts across multiple semesters, the faculty's opinions are below:

- The projects may or may not be related, or whether it is important that they are related.
- coordination of all professors involved
- The main issue is how to keep the same mentor, or coordinate between mentors. The mentor may not be the same in the multi-semester Honors contracts, because the mentor for the first Honors contract may not teach a course in the follow-on semester in which the mentee is enrolled.
- Timing is the biggest issue. Since the next chance the honor's student may be able to take the subsequent course may be a year away. Continuity is problematic.
- Consistency, continuity in terms of requirements.
- Motivating students
- Mentors may not have that student in class. The successive classes may not be in the scope of the original honor contract.

The students' opinions are below:

- larger time commitment and other commitments change semester to semester causing potential conflicts
- Defining exactly semester long portions of a project.
- Unavailable courses.

- Sometimes it is nice to have different projects each semester so that you don't burn yourself out on one topic.
- A potential issue could be time management and/or the student getting lost in the work. Allowing a project to continue pass one semester may lead to a unfinished project.
- Not finishing on time.

As one can see, several common themes are repeated in various answers regarding the challenges in carrying out a sequence of related Honors contracts across multiple semesters.

1. Coordination between instructors
2. Clear definition of a feasible Honors contract in the sequence in each semester
3. Time constraints and logistic feasibility

This practice may not suit every student in all situations, but if actual conditions allow it to happen, it is worthwhile and rewarding to try. This practice will greatly improve the chance of publications.

Multiple Honors contracts in Multiple Courses in a Single Semester

Having multiple Honors contracts in multiple courses in a single semester among engineering students and faculty surveyed was not very common, either, but it is more often than the multiple-semester sequential Honors contracts. This practice could be fueled by the 24 Honors credit hours requirement, especially for transfer students. 22% of the faculty members have mentored students who did this. 40% of the Honors College students have done this. The discrepancy could be due to incomplete data, or probably that sometimes an instructor may not be aware that an Honors contract student s/he mentors is taking on another Honors contract.

The participants have shared their perceptions of the advantages of such a practice in Fig. 7. These projects in the same semester are regarded by most participants to reveal a bigger picture and establish the knowledge bridge between two or more courses.

However, the student may be less focused in one project and the deliverable may be not as excellent as what s/he could have achieved if s/he is focused on only one project.

Taking multiple Honors contracts in a single semester would satisfy students' Honors College credit requirement quicker. This fact is pointed out in the "Other, please specify" field, repetitively (by 1 faculty member and 3 students). Also, the number of students' votes on this issue (3) is even bigger than the number of their votes (2) on the option of "solving a bigger problem that can not be solved in one course". This implies a tendency that the students are driven more by credit requirements, which is an extrinsic rewarding system, than an intrinsic rewarding system on project values and what they can learn through this practice. It is not an easy issue to address, given that the graduation requirements are quantified. However, we, as instructors, could try to motivate our students to a point where their own motivations would pick up to lead their own projects and their studies in general, and charge forward from there.

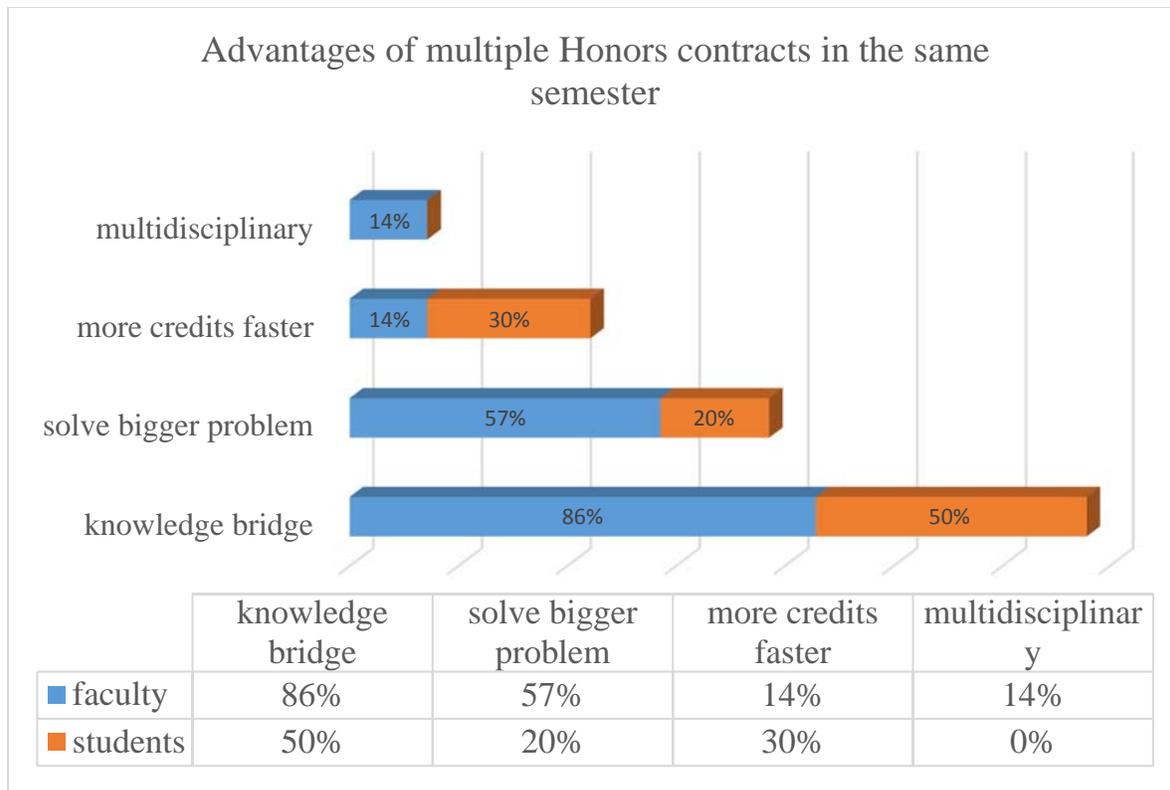


Fig. 7 Advantages of multiple contracts in the same semester.

Regarding the potential issue(s) for a student to finish multiple Honors contracts in a single semester, the faculty's opinions are below:

- The students may not have enough time to do their best on either of the Honors contracts.
- not enough time and reduced focus on academic courses
- The main issue is time management.
- Time constraints on the student. Since honor's contracts are meant to be more in depth, it should require more of the students' time.
- Excessive workload
- Too much work
- It might stretch the student too thin so as not to learn as much from each contract per semester.

The students' opinions are below:

- Destroys the point of it being multiple semesters, so you don't have the knowledge you might have had for the second half of the project.
- Some honors contracts are very large projects that would be difficult to finish in a semester alone. When taking on multiple projects the task of finishing each becomes much harder.
- Overloading a student.
- Boredom
- To get the max number of honors credit sooner
- It can add more stress.

Again, as one can see, several common themes are repeated in various answers regarding the challenges in carrying out multiple Honors contracts in a single semester.

1. Excessive workload
2. Time constraints
3. Unpreparedness in some knowledge

Despite the challenges, we will encounter this practice now and then, and we can be mindful to ask the student how many Honors contracts s/he is working on and possibly coordinate with the other instructor to balance the student’s topic assignment and work load in both contracts.

Not finishing an Honors Contract

Just as any task, there can be some Honors contracts that are left unfinished. 33% of the faculty members have had students who once did not finish their Honors contracts. 10% of the Honors College students admitted that s/he once didn’t finish the Honors contract.

As shown in Fig. 8, most faculty members and students acknowledge that the most common reason for a student not to complete an Honors contract is that the student got too busy during a semester. However, a specific case pointed out by a faculty member was that one student didn’t do much work until the last weeks of the semester and hence s/he couldn’t get enough time to finish it. Time management is always a key to finish a task successfully.

There is also another case mentioned by a faculty member that some students might sign up for multiple Honors contracts as there are no restrictions on that, but they can finish just one of them to gain enough credit for this semester and not to finish others. The reason for them to make a choice on which course to finish the Honors contract could be similar to why they signed up for a particular Honors contract earlier.

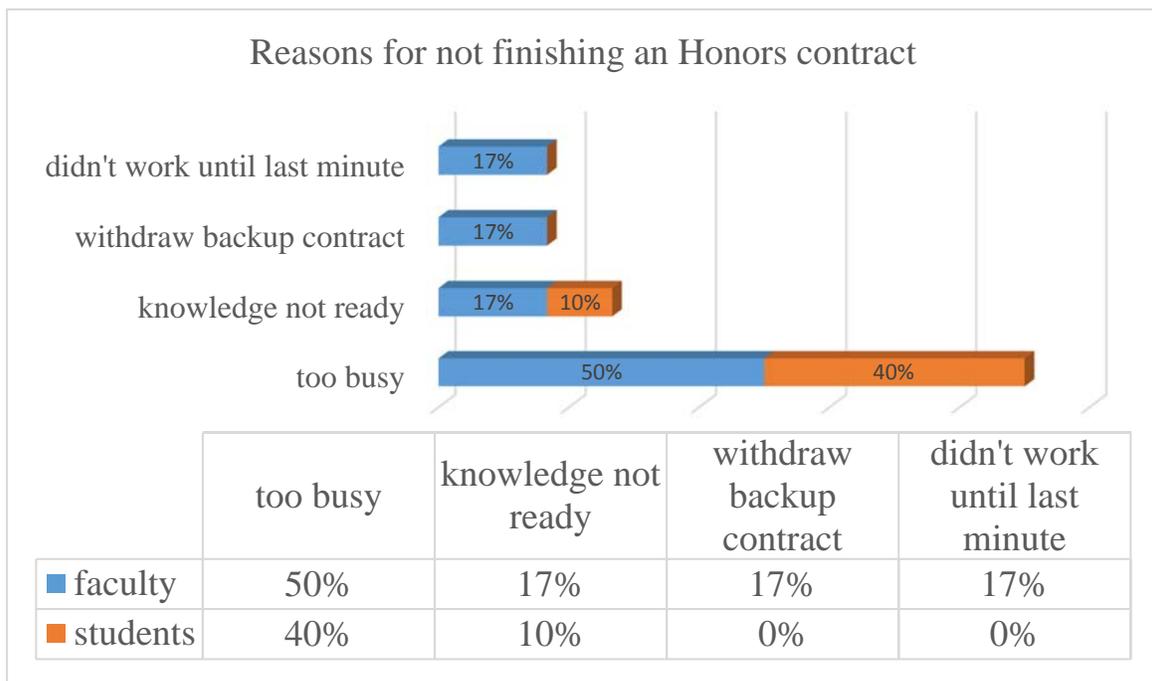


Fig. 8 Students not completing Honors contract.

Improvement Plan of Honors Contracts

Based on our survey results and the analysis, we propose to encourage the faculty to do the following to improve upon the existing approaches in mentoring an Honors contract.

1. Examine student motivations and encourage them to sign up for only one honors contract or at most two.
2. Encourage the students to come up with their own project ideas so that they would be more motivated to do them well. However, for the students who really don't have an idea on what to do, prepare some interesting topics and be willing to adjust throughout the process.
3. Follow a regular mentoring schedule with detailed action plans for each step, which can help the students to be more accountable, and to help them gain self-confidence.
4. Encourage the student to enjoy the process, even to make mistakes, instead of putting too much pressure on themselves. Let them see their values and accomplishments, at every step along the way.
5. Coordinate with other faculty members to see whether a sequence of honors contracts is feasible to let the students undertake a bigger project that could lead to publications, or whether the multiple Honors contracts in the same semester can complement each other.

Summary

This paper has thoroughly examined the practices of mentoring Honors contracts in the regular classrooms in the Engineering and Technology department at WCU. Two sets of Qualtrics surveys with the same sets of questions are sent to faculty and students. The analysis is based on the 9 faculty responses and 10 student responses to the survey questions. Given the relatively small number of participants, the percentages mentioned in this paper are not meant to be statistics, but only for readers' convenience.

Based on the survey results, an Honors College student decides to sign up an Honors contract in a particular course mostly because of the student's interest in this course (100%). The student's liking of an instructor is also influential (60%).

To fulfill the requirements of an Honors contract, a student is expected to submit a prototype, a circuit, or a software (depending on the nature of the course) as mandatory (100%) by both faculty and students. A written report is regarded more necessary by the faculty (89%) than by the students (70%). An in-class oral presentation is regarded more necessary by the students (70%) than by the faculty (67%).

The Honors contracts affect the students who conduct them in positive ways, helping them to learn by themselves (80%), to gain hands-on experiences (90%), and the Honors contract is beyond the scope of the regular class (80%). There are also some effects that are less frequent, such as learning software and mathematical tools (60%), helping the community (30%) and leading to publications (10%). It is worth noting that there is some inconsistency between the faculty and the students' opinions. First, most faculty think that they are fostering a mentoring relationship (89%), but fewer students feel that way (60%). This could be because the students

do not see the long-term mentoring relationship helping them in the long-term, instead of just a single course. Second, most faculty think that the students are gaining more self-confidence (89%), but fewer students feel so (30%). This is alarming, and a mentor could assist the students to define clear steps and timelines to help them see their achievements at each step along the way. Third, most faculty members do not think the Honors contracts could develop the students' oral presentation skills (33%), but many students think that they could (70%). An oral presentation could help the students go over their projects in a more systematic way, to share their achievements, and serve as an inspiration for other students.

The Honors contracts also affect other students in the class, and the survey participants think that the Honors contracts are more beneficial to the regular students (inspiring (70%), broadening views (30%)) than harmful (being left out or intimidated (20%) or no effect (10%)). Some professors have coordinated between themselves to mentor a sequence of closely related Honors contracts across multiple semesters, which is a rare practice due to many practical challenges, but is very rewarding with the potential to lead to publications. Most student participants think that such a practice would be beneficial for them to solve a bigger program in sequential courses (70%), or establish a knowledge-bridge between those courses (70%). The faculty members agree (78% and 67%, respectively).

Some students may sign up multiple Honors contracts in a single semester, either because they are interested in multiple courses, or they want to speed up their progress as they need to earn 24 Honors credit hours to be able to graduate with an Honors degree, which is especially needed for transfer students. Most faculty participants think that such a practice is beneficial for the students to solve a bigger program in multiple courses (86%), or establish a knowledge-bridge between those courses (57%), but the students are less enthusiastic (50% and 20%, respectively), perhaps because some of them have done it and experienced the common challenges (such as that each Honors contract is time-consuming and the students' work load might be too heavy). This may indicate that the previous positive responses on the advantages of taking multiple Honors contracts in sequential courses might be unrealistic. It will be interesting to conduct further study on such rare practices of taking multiple Honors contracts either sequentially or in the same semester.

Given the challenges in finishing an Honors contract, some students may not finish all the Honors contracts that they signed up for, mostly because they are too busy (40%), which may indicate that they did not have proper time management skills.

Based on the above analysis, several action items are proposed, such as encouraging students to see their values and accomplishments to gain more self-confidence, to assist students to maintain a regular schedule to work on the Honors contracts, to experiment with other forms of deliverables, and to coordinate with other faculty members to see what is feasible to create the synergy between multiple Honors contracts.

We plan to disseminate the findings in this paper to all the faculty and students in our department and the attendees at the ASEE conference. Perhaps some faculty or students are inspired by the ideas in this paper and adjust their practices. After a year or two, we could do a similar study to

see whether such knowledge on Honors contracts could make a difference to improve student satisfaction and faculty productivity.

The student participants in this survey were still students in college. The experience of obtaining an Honors degree is expected to be life-changing and beneficial to these students in the long run. It will be interesting if we conduct a future survey after these students have graduated and started their professional lives to see what effects the Honors contracts have on them, and what features of the Honors contracts are most beneficial and what can be changed.

Acknowledgement

Part of this material is based upon work supported by the National Science Foundation under Grant No. 1355872. Any opinions, findings, and conclusions or recommendations expressed in these materials are those of the authors and do not necessarily reflect the views of the National Science Foundation.

References

1. "The honors college phenomenon", edited by Peter C. Sederberg, published in 2008 by National Collegiate Honors Council. https://www.lanecce.edu/sites/default/files/honors/the_honors_college_phenomenon.pdf
2. Ossman, K. (2005, June), *Enhancing The Education Of Engineering Technology Students Through An Honors Program* Paper presented at 2005 Annual Conference, Portland, Oregon. <https://peer.asee.org/15438>
3. Honors Contracts Q&A for faculty and Students at WCU: http://www.wcu.edu/WebFiles/WordDocs/Honors_Contract_QandA_2011.docx
4. Bazlamit, S., & Middelberg, A., & Stiles, J., & Reza, F. (2004, June), *Introducing Research Into Undergraduate Honors Programs* Paper presented at 2004 Annual Conference, Salt Lake City, Utah. <https://peer.asee.org/12894>
5. Hochel, S. & Wilson, C.E. *Challenging the Superior Student Using Honors Contracts* (1996, November), *Challenging the Superior Student Using Honors Contracts*. presented at the Annual Meeting of the Speech Communication Association, San Diego, CA. <http://files.eric.ed.gov/fulltext/ED402859.pdf>
6. National Collegiate Honors Council (2015, May), *Official Online Guide to Honors Colleges and Programs*. <http://nchchonors.org/files/NCHC-Online-Guide-May-2015.pdf>

Appendix 1: WCU Honors College's Guidelines on Honors Contracts

What is a "good" Honors contract?

The best contracts are of mutual interest to the student and faculty member. Ideally, Honors contracts:

- Allow the Honors student to engage more deeply in a particular area of interest in the course.
- Allow the faculty member to try a new or innovative assignment that might prove useful for the general population in future classes.
- When possible, invite a student to participate in undergraduate research or begin a research agenda within a major.
- Depending on the discipline, invite a student to work on a creative project beyond the regular scope of the course (in theatre, art, or creative writing for example).
- Might involve a particular service project relevant to the course and/or the student's major.
- Might involve a student honing teaching/presentation skills through a presentation of out-of-class material to the class or an external group.

- When possible, result in a presentation of creative work or research results at the Undergraduate Expo, a regional conference, or the National Conference on Undergraduate Research.

What is a “bad” contract?

Contracts most likely to present problems usually:

- Are “busy work” (taking an extra quiz, for example).
- Are of little or no interest to the student or faculty member.
- Have no clear connection to the course.
- Have little or no tangible outcome.
- Are described so vaguely that the outcome is confusing to the student (i.e., “student will do an extra paper” or “student will read extra material”).

Appendix 2: Survey Questions and Answers

Question 1: Motivations for Students to Sign up a Particular Honors Contract

The survey questions for faculty and students are listed separately, but the choices are similar and in the same order. The number on the left hand side of the choice item is the number of votes in the responses. If some participants filled in the “Other, please specify” field, those responses are underscored and numbered in the order that they were received. This format is used throughout this paper.

Faculty: Based on your experience and/or your perception, what are the reasons that the Honors College students choose to do an Honors Contract in a particular course?

- 6 They are interested in the course and want to learn more beyond the regular course contents.
- 6 They know the instructor and want him/her to be their mentor on the Honors Contract.
- 3 They have already known what they want to do, being it the Honors Contract or not, so they just do it while earning Honors credits.
- 2 Students, especially the transfer students, need enough Honors credits to graduate with an Honors Diploma, so they just do so in all courses possible.
- 1 They can sign multiple Honors Contracts in a semester, but they are required to finish only one per semester, so they can have back-up plans.
- 1 Other, please specify: unknown

Students: Based on your experience and/or your perception, what are the reasons that you may choose to do an Honors Contract in a particular course?

- 10 I am interested in the course and want to learn more beyond the regular course contents.
- 6 I know the instructor and want him/her to be my mentor on the Honors Contract.
- 2 I have already known what I want to do, being it the Honors Contract or not, so I just do it while earning Honors credits.
- 2 Students, especially the transfer students, need enough Honors credits to graduate with an Honors Diploma, so they just do so in all courses possible.
- 0 I can sign multiple Honors Contracts in a semester, but I am required to finish only one per semester, so I can have back-up plans.

Question 2: Expected Deliverables of the Honors Contract

Faculty: What results do you expect the students to submit?

- | | |
|------------------------------|---|
| 11 (9 mandatory, 2 optional) | Deliverable (a computer program, a circuit, a sketch, a prototype, etc) |
| 8 (7 mandatory, 1 optional) | Submission of a written report, and if applicable, the presentation slides. |
| 6 (1 mandatory, 5 optional) | Presentation of their results in front of the class |
| 1 (1 mandatory, 0 optional) | Other, please specify: <u>deliverables depend on the student</u> |

Students: What results do you expect to submit?

- | | |
|------------------------------|---|
| 10 (8 mandatory, 2 optional) | Deliverable (a computer program, a circuit, a sketch, a prototype, etc) |
| 7 (4 mandatory, 3 optional) | Submission of a written report, and if applicable, the presentation slides. |
| 7 (4 mandatory, 3 optional) | Presentation of their results in front of the class |

Question 3: Expected Outcomes or Impact of Honors Contracts

Faculty: Based on your experience, has any of your Honors Contracts achieved the following? Or, based on your perception, do you expect the Honors Contracts to achieve the following?

- 9 The students have gained self-learning abilities.
- 8 The hands-on experience to carry out this project is in a larger scope than the course assignments/labs.
- 7 The depth of the project in subject matter is beyond the regular class.
- 8 The project fosters the mentorship relationship between the student and the instructor.
- 8 The students have gained more self-confidence.
- 5 The students have the opportunity to learn software tools and master advanced mathematical models.
- 3 The students could gain oral presentation skills.
- 2 The project is applicable in helping our local community.
- 2 The project can lead to publications.

Students: Based on your experience, have you achieved any of the following? Or, based on your perception, do you expect to achieve any of the following?

- 8 I have gained self-learning abilities.
- 9 The hands-on experience to carry out this project is in a larger scope than the course assignments/labs.
- 8 The depth of the project in subject matter is beyond the regular class.
- 6 The project fosters the mentorship relationship between the instructor and me.
- 3 I have gained more self-confidence.
- 6 I have the opportunity to learn software tools and master advanced mathematical models.
- 7 I could gain oral presentation skills.
- 3 The project is applicable in helping our local community.
- 1 The project can lead to publications.

Question 4: Effects of Honors Contracts on their regular classmates

Faculty: Based on your experience and/or your perception, what effect(s) may the Honors Contracts have on the regular students in the class?

- 7 Pro: The regular students may be inspired to try some experiments by themselves.
- 6 Pro: The regular students may have a broader view on what the course contents could lead to.
- 2 Con: The regular students may feel left out, intimidated, or inadequate to do more advanced projects.
- 1 Other, please specify: little effect

Students: Based on your experience and/or your perception, what effect(s) may the Honors Contracts have on your classmates who are not Honors College students?

- 7 Pros: The regular students may be inspired to try some experiments by themselves.
- 3 Pros: The regular students may have a broader view on what the course contents could lead to.
- 2 Cons: The regular students may feel left out, intimidated, or inadequate to do more advanced projects.
- 1 Other, please specify: [none specified]

Question 5: Multiple Honors Contracts in a sequence of courses, either taught by a single instructor, or by a group of coordinated instructors.

Faculty: In your opinion, what is the advantage to coordinate multi-semester Honors Contracts to solve a bigger problem?

- 7 The multi-semester Honors Contracts can relate to solve a bigger problem that a one-semester Honors Contract can not finish.
- 6 The multi-semester Honors Contracts can establish the knowledge bridge between multiple courses.
- 3 Other, please specify: (1) peers can work on projects together; (2) The multi-semester Honors Contracts can lead to undergraduate research efforts that prepare students for graduate study; (3) Prelude to Capstone

Students: In your opinion, what is the advantage to work on multi-semester Honors Contracts to solve a bigger problem?

- 7 The multi-semester Honors Contracts can relate to solve a bigger problem that a one-semester Honors Contract can not finish.
- 7 The multi-semester Honors Contracts can establish the knowledge bridge between multiple courses.

Question 6: Multiple Honors Contracts in multiple courses in a single semester

Faculty: In your opinion, what is the advantage for a student to finish multiple Honors Contracts in a single semester?

- 6 The multiple Honors Contracts can establish the knowledge bridge between multiple courses.
- 4 The multiple Honors Contracts can relate to solve a bigger problem that a single Honors Contract can not address.
- 2 Other, please specify: (1) They can get more Honors credits; (2) Could be multidisciplinary

Students: In your opinion, what is the advantage for you to finish multiple Honors Contracts in a single semester?

- 5 The multiple Honors Contracts can establish the knowledge bridge between multiple courses.
- 2 The multiple Honors Contracts can relate to solve a bigger problem that a single Honors Contract can not address.
- 3 Other, please specify: (1) get it out of the way to free up time for the future; (2) To get the credit done faster; (3) To get the max number of honors credit sooner

Question 7: Not finishing an Honors Contract

Faculty: What do you think as the reason(s) that the student did not finish his/her Honors Contract?

- 3 S/he was too busy.
- 1 S/he was not equipped with the knowledge to carry it out.
- 1 S/he signed up for multiple Honors Contracts, and then chose one of them, other than the one in my course, to complete.
- 1 Other, please specify: S/he did not manage his/her time well. The student did almost nothing on the project all semester and then tried to complete the contract during the last weeks of the semester.

Students: What do you think as the reason(s) that you did not finish that Honors Contract?

- 4 I was too busy.
- 1 I was not equipped with the knowledge to carry it out.