# Implementation of a Proactive and Effective Advising Program in a Large Civil Engineering Program In the Face of Budgetary and Organizational Constraints

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#### Abstract

Assessment data from a senior exit survey in 2009 indicated significant dissatisfaction with the advising received at a large regional university. At the time the civil engineering program had over 1500 undergraduate students and only 16 full-time faculty members, resulting in a student to faculty ratio of 90:1. A review of the existing department advising program and retention data indicated the greatest short coming was in early advising of first year students. Training of all existing advisors on the specific needs of first year students proved unsuccessful in improving first year advising. An informal survey of faculty indicated a disinterest among the majority of faculty in learning the special issues freshmen and first year transfer students face. Both budgetary and work role constraints inhibited the program from adopting techniques such as hiring dedicated lower division advising staff. Cognizant of the existing structural constraints, a three phased approach was designed to address the advising needs of students throughout their academic careers. The first phase, implemented in winter of 2011 was to provide group advising sessions where consistent and targeted guidance was provided to all students according to their academic standing. The second phase of implementation started in the fall of 2012 and employed a dedicated group of advisor for entering freshmen and transfer students. This group of advisors was selected for their interest and willingness to advise first year students (freshman and transfer). They received special training in advising of these students. The third phase, yet to be implemented, is a dedicated advising group for at-risk students (overall GPA below 2.2). Preliminary assessment data from spring 2012 indicate a significant improvement in the advising, measured by student exit surveys. This paper presents the specific advising program implemented and how organizational and structural constraints were overcome.

### Introduction

Higher retention rates have been linked to early advising. When students are provided with the appropriate resources at the university they have a tendency to have a higher level of success<sup>1</sup>. As the civil engineering (CE) department at California State Polytechnic University Pomona (Cal Poly Pomona) was preparing for their periodic ABET visit an analysis of the senior exit survey determined that students felt the faculty did not provide enough advising (refer to the results section of this paper for further details).

There were many factors that influenced their response. Enrollment with the CE department is quite high. The most recent data (2010) on enrollment numbers were compiled from the Engineering Workforce Commission. The Civil Engineering (CE) program at Cal Poly Pomona is the largest undergraduate CE department in the nation, as shown on Table 1<sup>2</sup>.

Table	1: Enrollment	t numbers fo	or the top t	en largest	Civil En	gineering	programs	in the	U.S.
				-		-			

School	No. Enrolled
Cal Poly-Pomona	1148
U Puerto Rico	948
Texas A&M University	945
U Illinois-Urbana Champagne	803
U Cal-Davis	671
U Florida	669
Cal Poly-San Luis Obispo	649
Virginia Poly Institute	638
Purdue University	629
NC State Univ-Raleigh	609

Starting in the fall of 2009 the CE department at Cal Poly Pomona changed from open enrollment to selective enrollment (i.e. impaction). This gave the department more control over the number of students admitted into the program and has allowed the department to steadily reduce the number of undergraduate students. Figure 1 provides a graph of active and enrolled students per academic quarter from fall 2009 to winter 2013. Active students include students that have decided not to enroll in classes for a given quarter but are still part of the department, while enrolled students are taking courses within the university.



Figure 1 -Active and Enrolled Students from Fall 2009 to Current

The ultimate goal is to bring undergraduate student enrollment to approximately 950. During the same time period, the CE department was able to secure additional tenure track faculty positions and increased the number of tenure and tenure track faculty to 18. The decreased student body and increased faculty reduced the student to faculty ratio to a more manageable level. However the number of students and the variety of advising needs (academic vs. personal; at-risk vs. honors students) still puts a heavy advising load on the faculty. Part of the challenge rises from the mix of traditional and non-traditional students. Significant portions of the Cal Poly Pomona's student body are employed for more than 35 hours per week, attend school part-time, or care for dependents. The ability to provide individualized general student advising continues to be a challenge.

Teaching loads at the university are high. Most full-time faculty teach 3 to 4 courses each term. Budgetary challenges have increased class size by approximately 25%. The large teaching load requires significant faculty time, not only in the classroom, but outside the classroom for course assessment, development, and so forth. Many faculty members had little time to devote to advising and keep up with the number of students enrolled in their courses. Thus the typical faculty member was able to offer only reactive and prescriptive advising<sup>3</sup>. This approach did not provide students with the individual attention needed to meet their specific needs, whether it include study skills, curricular advice, career planning or referrals to a student support program.

Research by Pardee<sup>4</sup> noted that most students expect a prescriptive approach to advising, however, others pointed out that simply advising student to address the current crises is too narrow a focus and leaves the student vulnerable to future crises<sup>5,6</sup>. Other studies have shown that quality advising can improve both student retention <sup>7</sup> and performance.

A number of faculties within the university recognized both the need for quality advising and the ineffectiveness of many department-based advising programs. In response, the

University and College of Engineering created a number of ad hoc advising functions to assist students with specific needs. These ad hoc functions proliferated to the point that a freshman might be advised by as many as 6 different offices on campus during their first year. They are often intrusive in nature, forcing students to attend special advising sessions before being allowed to register for courses. More importantly, the facilitators of these advising functions were not part of the civil engineering program and thus could not provide students with coherent advising appropriate to the curriculum. During the 2011-2012 academic year the CE department established a committee to develop a single integrated department advising program.

### Methodology

The department advising committee developed a three part advising improvement plan. The goal of the first stage was to provide essential prescriptive advising to ensure a consistent and effective message. This was accomplished through a group advising program. The effectiveness of this program was discussed in an earlier paper<sup>8</sup>. The second stage, reported in this paper, provides focused faculty advising by creating specialized advising teams. Prior to implementation, each team was trained to help students in a particular phase of the students' academic career. The final stage, still to be implemented, is to provide guided advise to at risk students (those with a GPA below 2.2)

### Second Stage Overview

Prior to the spring of 2012 the civil engineering program assigned each student to an advisor without regard to the student's class standing or the faculty member's interests or skills. All tenured and tenure track faculty were required to be advisors. Each adviser was expected to provide the student with all the needed guidance in learning skills, campus resources, curriculum, career planning, graduate school planning, and anything else required. Additionally, recent faculty turnover (due to retirements and new hires) required the department to reassign advisors every year. Many students seemed frustrated due to the lack of consistency in advisors and responded by choosing not to visit their adviser.

Advising was mandatory only for students who were part of the Kellogg Honors College (KHC), 4-year Pledge Program, students classified as being at-risk or on academic probation (GPA below 2.2). A single faculty member within the CE department was responsible for all KHC and 4-year pledge student's prior to the 2010 academic year. The number of students these two programs contain grew considerably since that time (See Figure 2). This was due to increased advertising of these program and improved student quality since selective enrollment started. Thus, additional faculty resources were needed to assist with these special groups.



- Total Freshman - - % Accepted KHC ----% Accepted 4-year Pledge Figure 2 – Evaluation of the Students Accepted into the KHC and 4 year Pledge Programs

In order to address the advising challenges the committee developed the following objectives for the advising program.

- 1. Help students understand the nature and purpose of higher education.
- 2. Help students plan an educational program consistent with their interests and abilities.
- 3. Guide transfer students through the process of ensuring all their transfer units are properly reported within the university system.
- 4. Assist students understand the importance of extra-curricular programs: student clubs and teams, industrial experience and research experience.
- 5. Assist students in monitoring and evaluating their academic progress.
- 6. Advise students on the selection of courses appropriate for their interests and abilities (including course sequences and requisites).
- 7. Provide accurate guidance on university policies and procedures.
- 8. Refer students to special University services as needed.

It was unrealistic to expect each faculty member to be able to address all of these advising needs. Additionally, most faculty members were interested in only certain areas of advising. Thus a tiered advising structure was developed during the 2012 academic year. The advising committee evaluated the strengths of each faculty member and divided them into teams that became subject experts in advising a specific cohort of students. Three advising divisions were created: 1) Lower Division (underclassman); 2) 1<sup>st</sup> Year Transfer Students; and 3) Upper Division. In addition, all lower division advisors are responsible for advising the 4-year Pledge program and KHC students. Table 2 shows how each group addressed the advising objectives.

Table 2 - How to address advising objectives by each conort?									
Advising Cohort	Objective No. o					No. of			
	1	2	3	4	5	6	7	8	Faculty
Lower Division									5

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1 <sup>st</sup> Year Transfers					2
Upper Division					11
4-year Pledge <sup>a</sup>					5
KHC <sup>a</sup>					5

a. Same Faculty as those in the lower division cohort.

### Lower Division

Students in this division started Cal Poly Pomona as a freshman and have not completed Vector Statics. These students are assigned to their advisors for their first two years. In order for first year student to build a relationship with these advisors the faculty team teaching the Introduction to Civil Engineering (CE 122) course have worked together to develop a program that would require intrusive advising to student enrolled in the course. These students are required to develop a 4 to 5 year educational plan, which lays out the courses that they plan on taking during their time at Cal Poly Pomona. Student are expected to learn when classes are offered, evaluate prerequisites and set a goal to graduate. Finally, they need help navigating through Cal Poly Pomona.

# <u>1<sup>st</sup> Year Transfer</u>

Students in this division entered transferred from a different school into Cal Poly Pomona. These students are assigned to a specified advisor for a single year. One of the challenges that transfer students face is determining which credits should have transferred and provided them with credit. In addition, this group also needs to develop a 3 year educational plan, which lays out the courses that they plan on taking during their time at Cal Poly Pomona. Student are expected to learn when classes are offered, evaluate prerequisites and set a goal to graduate. Finally, they need help navigating through Cal Poly Pomona.

# Upper Division

Students are in this division if they started as a freshman at Cal Poly Pomona and this is their 3<sup>rd</sup> year or if they transferred into Cal Poly Pomona and this is their 2<sup>nd</sup> year. Most students in this program are starting to take courses in the 300 level CE curriculums. These advisors guide students on developing a career path and evaluate their academic progress.

# 4-Year Pledge

Student's part of this division will see a lower division advisor for the entire time they are part of the program. With the growing number of years it takes students to graduate, the university designed a program to guarantee graduation for entering freshmen. The pledge program involves a promise by students to balance school, work and personal responsibilities so that their commitment to education is honored. Students that participate in this program must remain in their selected major, must complete 25% (49.5 units) of the required graduating units per year, maintain a 2.2 cumulative GPA and earn a "C" or better in all courses. The advising program required by the 4-Year Pledge Program requires students to meet with their academic advisor each quarter to sign their quarter plan for priority registration. The program is based on the philosophy that if both the University and the student uphold their commitment, graduation

in four years should be guaranteed. Advisors assigned to work with 4-year pledge students cover both lower and upper division student advising.

# Kellogg Honors College (KHC)

Student's part of this division will see a lower division advisor for the entire time they are part of the program. The KHC is composed of a community of talented and motivated students. Many of these students are also part of the 4-year Pledge program. These students are invited to apply prior to entering Cal Poly Pomona. The KHC augments their scholastic experience at Cal Poly Pomona through individual advising within each department and KHC mentor to support personal and intellectual growth and successful program completion. Honors students take "Honors Sections" for several of their required classes, have access to an Honors Commons, and have funded opportunities. Requirements to maintain good standing in the Kellogg Honors College include: 3.30 or higher Cal Poly Pomona GPA, approximately 15 hours of Civic Engagement (community service) per year, and full time enrollment. Advisors assigned to work with KHC students cover both lower and upper division student advising.

### Results

Starting in the 2009-2010 academic year, students were asked to fill out a survey about their experience as a student at Cal Poly Pomona's civil engineering program at the end of the senior capstone course. In this survey students were asked to respond to the following statements:

- 1) The quality of advising I received related to academic planning was:
- 2) The quality of advising I received related to professional career planning was:
- 3) The quality of advising I received related to graduate school planning was:

Students responded based on the following scale:

- 1) Very poor;
- 2) Poor;
- 3) Satisfactory;
- 4) Good; and
- 5) Very Good.

The results of this survey, over the past 4 academic years, are summarized in Table 3. In the initial response to this survey, collected in the 2009-2010 academic year, a large majority of students stated that the level of advice they received was poor (2) to satisfactory (3). These results demonstrated the ineffectiveness of the department advising program in place at that time.

Table 3– Senior Exit Surve	y Reponses: Average responses	nses from 1 (very p	poor) to 5 (very good)

Cotogory	Academic Year						
Category	9-10	10-11	11-12	12-13			
Number of Students	119	194	176	53			
Curricular Planning	3.32	3.29	3.54	3.49			
Career Planning	3.11	3.29	3.40	3.22			

Grad School				
Planning	2.65	3.18	3.02	3.04

Since the implementation of the comprehensive and proactive advising program described above, the survey results indicate a steady improvement the quality of advising students receive regarding curriculum, career and graduate school. The highest level of increase can be seen in how students responded to career and graduate school planning. The increases in career and graduate school planning are most likely linked to group advising sessions dealing specifically with these topics. Students rate the advising to be satisfactory (3) to good (4). The curricular advice does not show much of a change. This is understandable because intensive curricular planning advice started with freshmen and transfers in the 2010-2011 academic year. These students will not reach graduation until the 2014-2015 or 2015-2016 academic year. The department expects to see a change in the results staring in the 2014-2015 academic year.

Retention, or student persistence, within a major can be significantly affected by the quality of advising. As the department has changed it advising the overall persistence of students within the major is expected to improve due to department level advising. The data in Table 4 categorize students by whether they entered as freshman or transfers. It shows the percent that persisted within the civil engineering major each year based on the matriculation year (year started at Cal Poly Pomona).

Matriculation	Persistence Rate Freshman									
Term	1	2	3	4	5	6	7			
F 2005	85%	78%	69%	62%	44%	19%	5%			
F 2006	83%	82%	77%	70%	45%	18%				
F 2007	88%	81%	78%	73%	52%					
F 2008	85%	80%	76%	65%						
F 2009	92%	84%	77%							
F 2010	99%	93%								
F 2011	97%									
Matriculation	Persist	ence Rate –	- Transfers							
Term	1	2	3	4	5	6	7			
F 2005	88%	81%	38%	13%	9%	5%	3%			
F 2006	89%	82%	42%	22%	11%	3%				
F 2007	77%	75%	52%	25%	13%					
F 2008	79%	73%	50%	19%						
F 2009	78%	74%	41%							
F 2010	94%	88%								
F 2011	92%									

Table 4 – Student Retention based on	Years Spent at Cal Poly Pomona
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The department switched from open to selective enrollment in 2009. The data suggests that impaction has an effect on freshman persistence in both the first and second years starting in

2009. However, there are not enough data points to evaluate the persistence after the third year. Transfer persistence rates do not appear to increase significantly until 2010.

As shown in Table 4, before selective enrollment, the one year persistence rate was consistently less than 90%. Since selective enrollment started (2009) the one year persistence rate is well above 90% and the two year persistence rate is well over 80%. There is a significant drop in persistence in the third year for the 2009 cohort. The cause of this drop has not been determined. A the time of writing, data were not available to determine whether students leaving civil engineering switched to another STEM (science technology engineering math) program, switched to a non-STEM program or left the university. There is a large drop in the persistence of transfer students in the third year which is associated with graduation (33% of students graduated).

Students in the 2009 cohort did not benefit from the new advising program while those in the 2010 and 2011 cohorts did. As more data is collect it will be possible to compare the persistence of the 2009 cohort with later cohorts. This may provide some evidence on the effectiveness of the new advising program.

# **Future Work**

Moving forward, more observation of the first (presented in an earlier paper) and second (presented here) stages of the advising program at Cal Poly Pomona are needed. As the second stage continues to be observed more data will help determine if there is a significant impact on student perception of advising, student retention rates, and thus overall graduation rates. More work needs to be done to separate out those students who switch majors after entering the program, drop out of school entirely or graduate from the persistence numbers.

Cal Poly Pomona, similar to many other universities has designed a system to provide students with their academic standing. A majority of the students fall under the "good academic standing" category. However, students who are having the most difficulty navigating the system will be addressed in the next stage of the CE departments advising program. These students fall into one of three categories: Early Warning (at Risk), Academic Probation, or Subject to Disqualification. An undergraduate student with a Cal Poly Pomona grade point average below 2.2 is considered at risk. An undergraduate student with an overall or Cal Poly Pomona grade point average that falls within the following ranges is placed on academic probation.

- Freshmen, 1.5 1.99 GPA
- Sophomores, 1.7 1.99 GPA
- Juniors, 1.9 1.99 GPA
- Seniors, 1.95 1.99

An undergraduate student is subject to disqualification if the student's grade point average is below the probation level listed above for more than two quarters. If a student falls into any of the three categories, a registration hold is placed upon their account and they are required to meet with their adviser to lift the hold. Meeting with their adviser, a student is required to develop a plan to improve their GPA. Academic departments may disqualify a student if they fail to meet the terms of the advising worksheet or fail to make progress in the major.

Figure 3 provides a summary of the percent of students who fall into one of the three categories listed above. The data clearly show a significant reduction in students in academic trouble starting in fall 2010. This dramatic reduction is most likely due to a combination of selective enrollment and the new advising program within the CE department at Cal Poly Pomona. A great benefit of investing advising time with the underclassmen cohort is that it provides them with a solid base that can keep them out of academic trouble throughout their academic careers. This not only increases student success but also reduces the time needed to provide special advising for students in academic trouble.



Figure 3 – Percent of Active Students: Subject to Disqualification, on Academic Probation or At Risk.

# Summary

Overcoming organizational and structural constraints associated with advising in a large regional university was accomplished. The CE department at Cal Poly Pomona achieved their plan through the development of dedicated faculty to address student needs at various levels of the undergraduate education (i.e. lower division, upper division, transfers, KHC and 4-Year Pledge). Though the amount of data collected through the senior exit surveys are limited when it comes to evaluating the success of the program, students seem to be reacting favorably to the approach. The results also indicate that student persistence has improved but more research and data is needed to determine if this improvement is associated with selective admissions or advising. Persistence (i.e. retention) is not necessarily the primary objective, but it is the best indicator that an institution is meeting its goal of student satisfaction and success. Overall, students state that they are grateful that faculty cares about their overall success, which is similar to other studies that show students need more than just curricular advice<sup>7</sup>. The purpose of specialized advising teams is used to enhance the existing strengths of faculty members and improve the students experience at Cal Poly Pomona.

#### Acknowledgements

The authors would like to take this time to acknowledge the Civil Engineering department and College of Engineering at Cal Poly Pomona. They provided the faculty with support to make group advising feasible. The authors would also like to thank Ms. Angela Hicks, who is part of the department advising committee.

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