A First-Year Experience Self-Management Course for Computer Science Majors

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Institution and Students

Marist College is a private, predominantly undergraduate, not-for-profit institution overlooking the Hudson River in Poughkeepsie, NY, midway between NYC and Albany. Founded in 1929 by the Marist Brothers, Marist is now ecumenical in character, and reflects the commitments of its founders: excellence in education, higher human values, and service. The college has approximately 5,100, undergraduates and 890 graduate students (73.5% Caucasian; 8.7% Hispanic/Latino; 3.6% African American; 2.7% Asian; 2% non-resident aliens; 0.1% American Indian or Alaskan Native; 0.1% native Hawaiian or other Pacific Islander; 1.9% multiracial; and 7.4% unidentified). Seventy percent of undergraduates (59% female and 41% male) reside on campus.

Marist has offered a FYE self-management course with generally uniform content across sections for nearly three decades and in 1999 it was recognized by the John Templeton Foundation. Approximately 15-20% of freshman class enrolls in this three-credit, 15-semester hour elective annually. A discipline-linked version of the self-management course offered to computer science and information technology (CS/IT) freshman majors is the focus of this case.

Self-Management Course for CS/IT Freshmen

Marist was experiencing a decline in its computer science/information technology (CS.IT) major due to low enrollment and attrition in the major, a nationwide trend despite the field's robust job market (Carter, 2006). Nationally, this decline was higher for groups historically underrepresented in CS/IT (National Science Board, 2002; NSF, 2011; Goode, 2007; Margolis, et. al, 2003, 2008). Academic performance, retention, and self-evaluations of self-management skills for freshmen who took the self-management course had shown improvements (Berger, 2003). Two recent freshman classes had shown a graduation retention rate 2% higher than for students who had not taken the course. This data also showed that few CS freshmen were taking the self-management course.

To increase enrollment, retention, and diversity in Marist's CS/IT major, NSF awarded Marist two grants to fund scholarships and an FYE for two freshman cohorts of ethnically-diverse, low income, academically-talented CS/IT majors. The first cohort of 13 entered in 2010 and consisted of 9 males and 4 females (2 African Americans, 4 Hispanic, 2 Native Hawaiian, 4 Caucasians, and 1 Indian/Asian). The second cohort entered in 2014 and students are in their sophomore year at the time of this writing. This cohort of 17 consists of 13 males and 4 females (2 Caucasians, 1 Asian, 1 Hawaiian, 2 African-American, 3 Hispanic, 4 multiracial; 4 undisclosed). The second cohort included additional scholarships, 3 from Goldman Sachs and 1 from Marist. All students were pre-enrolled in a discipline-linked self-management course and two introductory CS courses as a condition of their full CS/IT scholarships.

Jane Fiore, Director of Marist's Academic Learning Center, taught the self-management course and served as the students' secondary advisor. Ron Coleman, Professor of CS, taught the CS classes, was academic advisor to the cohorts, and the principal investigator on the NSF awards.

High impact educational practices are integrated throughout the self-management course (Kuh & O'Connell, 2013). ***Significant time and effort*** is placed on the ABC approach to self-management, which is defined as "the ability to manage personal affect, behavior, and cognition (ABCs) toward one's goals" (O'Keefe & Berger, 2014).

Students learn to distinguish among affect (emotions and sensations), behavior, and cognition that contribute to or detract from academic, personal, and professional goals and success. For example:

- affect (A) such as excitement, joy, happiness, high energy, calmness, fear, anxiety, frustration, low energy, etc.
- behaviors (B) such as participating in class, sleep and study habits, following a schedule, social habits, etc.

- cognitive (C) processes such as problem solving, visualization, self-talk, metacognitive skills, balanced, nonjudgmental thinking, etc.

Reflection and integration of principles and research-based methods are practiced as students learn self-management methods.

Methods include techniques for:
- managing affect (A) such as relaxation, deep breathing, stress management, and cognitive disputation
- managing behavior (B) such as contingent use of rewards, shaping, and contingency contracts
- managing cognitions (C) such as imagery, visualization, accurate, specific, balanced, and nonjudgmental self-talk, cognitive reframing, and thought stopping

In sum, the ABC approach is a system for managing ABCs relevant to personal goals and is the common, unifying core for goal achievement and all self-management topics, including self-motivation, time management, and communication skills.
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Motivation

"Why are some students motivated in class, while others are not?" is a question many instructors ask. If highly motivated students are asked this question, they might say something like "the class is fun" or that "professor is awesome." Few cite the elements actually driving their positive academic motivation and most could not explain how to generate it or how to restore it when it is lost.

To demystify skills in self-motivation, life-like case studies illustrate how ABCs comprise personal motivation. The following case study excerpt shows how John's ABCs are contributing to negative ABC interactions and interfering with his motivation in class. (ABC notations are not shown in the actual cases students assess.)

John views (C) his art class as a complete waste of time and is annoyed (A) that he is required to take this class. He cannot understand (C) why a computer science major like himself has to sit through lectures on art history that he finds so boring….John has missed (B) quite a few classes and has not kept up with the assignments (B). He thinks the readings are difficult (C), gets tired (A) when he reads, and believes he is not cut out for all this abstract stuff (C)… Sometimes the teacher notices that John is not paying attention and calls on him. When this happens, John gets angry (A) at the teacher for putting him on the spot.…

After reading cases, students describe:

- examples of John's ABCs from the case
- any ABC interactions interfering with John's motivation

- the A, B or C "trigger" initiating an ABC interaction
- a method John might use to change or diminish his A, B, or C "trigger"
- how changing John's ABC trigger and other ABCs would enable John to become more motivated in the class.

Student learning objectives are focused on the ability to accurately distinguish among ABCs; to recognize ABC interactions; to understand how changing ABC triggers change ABC interactions and, for this case example, to improve self-motivation skills.

Students provide different case answers. Some identify C as the trigger of John's motivational problem (*viewing art class as a complete waste of time*) and suggest that C leads John to be annoyed (A) and avoid class (B). To change this C>A>B interaction and improve John's motivation, a student might suggest John change C by using methods such as cognitive reframing or exchanging more balanced, nonjudgmental thinking for his negative self-talk. Other students identify B as the trigger (not participating), and suggest this behavior leads John to think of the class as a waste of time (C) and become annoyed (A). Because of ABC interactions, a downward ABC spiral could escalate as John misses classes (B), thinks (C) the teacher is putting him on the spot, and gets angry (A) at the teacher. To change John's "trigger," John might simply ask (B) two questions in every class. To support this behavioral change, a method such as contingent use of rewards or shaping might be recommended.

Similar case studies are used to demystify skills in time management, communication skills, and goal achievement by showing how ABC identification and change are central to self-management in all of these areas. Cases provide structured opportunities for students to reflect on what ABCs and ABC interactions are, integrate this understanding as they work toward their own goals, and practice using the ABC approach in situations they deem important.

Other assignments enable students to practice and assess ABC skills.

> *For time management*, students keep track of what they do (B) for a week (before creating a time schedule) by completing a chart that shows how much time they spend in general activity categories (e.g. studying, sleeping, eating, chores, socializing, classes, exercise, free time, etc.). Students record the number of hours they spend daily in each category and bring these data to class and total the hours by category. Before outlining a time schedule for the semester, they reflect on how they have been spending their time and whether their current activities (B) are relevant to reaching the goals they identified for themselves earlier in the semester. They then devise and follow a realistic time schedule, review their progress each week, practice making ABC changes and modify the schedule as needed to keep themselves on track.

> *For communication skills,* students deliver a presentation on their career or personal goals. The presentation is delivered to the class and video recorded. Students are provided with a copy of their presentations to self-critique. This assignment provides

practice in several important self-management skills including motivation, communication skills, general organizational skills, and in applying self-management methods. Students are advised to employ skills learned in class to prepare for their presentations. For example, students who experience stress in delivering public presentations can use the ABC approach to identify what is triggering their stress, anxiety, fear, nervousness and practice using methods to minimize it before and while presenting. For many, this exercise provides the impetus for practicing self-management methods, while developing communication skills in a safe public setting.

Evaluation of Educationally Effective Practices

Skill Development

Student understanding and use of the ABC approach in different situations in freshman year and over time are the focus of skills evaluation. Students are graded on their knowledge of key principles and applications taught in class such as case study analyses. The impact of course activities in the short- and longer-term are evaluated by student self- evaluations and senior year surveys and interviews.

For motivation, the instructor evaluates case study responses and provides feedback. For time management, students are provided instructor and student feedback on their case study responses. Students also evaluate their own progress in following a schedule and using ABC principles to manage their time and meet their semester goals.

For communication skills, students are provided instructor and student feedback on case study responses and their presentations. Students also review and evaluate the videotape of their presentations and comment on ABC methods used or might have used to improve in preparing or delivering their presentations. While students dislike this assignment initially, they consistently give positive feedback after completing it.

A senior survey was administered to the first cohort. Six out of 8 respondents found the self-management course helped with motivation, time management, and public presentation skills while in college. This survey also suggested a need for additional focus on methods for managing ABCs. The second cohort will be invited to compete the survey in 2018.

Six of the seniors from the first cohort also participated in interviews and commented on self-management course outcomes. Below are sample student comments:

- *The course made you focus and be self-aware – and made it easier to manage your skills and time.*
- *I actually kind of liked that class because we had a bunch of CS classes and then we had that class to get used to college and manage ourselves. It helped in prioritizing and scheduling.*

- *Being aware of your emotional responsibility and how to manage your stress - I think stuck with a lot of the students.*
- *I learned a lot about myself. It solidified my understanding of time management, how I learn, how to handle certain problems.*
- *At first I thought it was useless, then later, I ended up using the techniques. I'm like wow that's a really good thing. I guess it wasn't so useless!*
- *We learned ways to deal with higher stress -- breathing is one thing, but another is changing the voice in your head. You could be telling yourself one thing, but it is not reflecting how reality actually is.*
- *[With problems] I was able to change my inner voice and that in turn changed how I felt… I started doing that and thought wow, okay, cool.*

A previous study of 600 students in the general self-management FYE course had shown significant pre-post course change in students' perceived ability (across topic areas) to self-manage (Berger, 2003). This self-management scale was recently modified to include questions on skills relevant to CS/IT major and was field tested for the first time with the second cohort prior to and after they completed the discipline-linked self-management course. Preliminary analysis of the results has begun and plans for further modifications of the scale are planned for use with future CS/IT cohorts.

Retention and GPAs

The 4-year retention rate in the major for the first cohort was 85%, compared to a range of 35% to 50% for CS/ITS majors who were not in the cohort. The average graduation GPA was 3.41 on a 4-point scale, compared to 3.31 for the remaining 80% of 2014 CS/IT graduating class. The first valedictorian with a major in CS in Marist's history was in the first cohort; graduated with a 4.0 GPA; and employed by a Fortune 500 company that now contributes full scholarships to CS/IT students selected to participate in the program. The first-year retention rate in the CS/IT major for the second cohort is currently 100% and the average end-of-freshman year GPA was 3.57.

Implications

Student persistence is largely contingent on students' ability to self-manage over time, and key to retention and academic achievement (Watson & Tharp, 2006; Berger, 2003). Data on freshmen who took the FYE self-management course are promising and preliminary data on the discipline-linked cohorts have shown a dramatic improvement in retention in the major and positive results in several skill areas. However, scholarships also influence persistence as can co-enrollment in common courses and many other academic and non-academic factors (Tinto, 1982, 1988, 1997; Lotkowski, et. al, 2004; Glenn, 2007; Finley & Kuh, 2016; Kober, 2015). Future

studies need to account for these influences, while examining the effects of specific FYE course activities. Questionnaires, interviews and surveys are steps in this direction, but comparative studies that include students who are not receiving scholarships and not co-enrolled in common courses would be useful.

The ABC approach holds promise as a high-impact component of FYE seminars that is efficient and practical. Its potential value is the cultivation of skills that can have immediate and long-term benefits. By teaching basic and advanced ABC skills, seminars can be more focused to better serve students' needs and allow broader impact. A variety of topics can be integrated and connections among them demonstrated within a general ABC framework, and activities that have greater relevance to students long-term success can be taught. Because the approach is relevant to any field, FYE instructors and disciplinary faculty could collaborate in identifying ABC skills essential to particular fields. Such efforts would open new avenues for FYE instructors to support the major and enable students to recognize the connection of the FYE seminar to the major.   Identifying key ABC skills that are important to the discipline also opens collaborative teaching and research opportunities between FYE seminar instructors and faculty that can improve student learning (Singer, et. al, 2012).

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