

## **AC 2009-2236: UNDERSTANDING ENGINEERING FRESHMAN STUDY HABITS: THE TRANSITION FROM HIGH SCHOOL TO COLLEGE**

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# **Understanding Engineering Freshman Study Habits: the Transition from High School to College**

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## **Abstract**

The transition from high school to college is traumatic for most students. For the first time, most freshman students are on their own and no one is watching to see that they attend class, do their assignments, get proper sleep, and eat healthy. Many freshmen college engineering students who did very well in high school may tend to believe that since they were successful in high school, they need little or no help in making it in college as an engineering major.

The author has surveyed freshmen for several years to learn that the average number of hours they studied a week outside of class during their last semester in high school was about two or three hours. Many engineering freshmen do not put in the time that they should be in learning their classes until they hit the first quizzes or a midterm and suddenly realize that they have a lot of learning to make up to be on top of the class material. Many students do not know how to learn material.

This paper will explore the transition from high school to college relative to the number of study hours a freshman engineering student devotes each week and the “solutions” that have been used to help with this problem through a literature search. The paper will discuss how much engineering students study their last year in high school, how much the students plan to “study” in college, and the reasons students will acknowledge a need to study more in college. A partial solution to poor study habits, the Guaranteed 4.0 Plan, will be discussed, as well as the excuses and rationalizations that students use for not following such a plan, and evaluations by engineering students who have adopted the 4.0 Plan.

## **I. Introduction**

The transition from high school to college is the largest change that most people will ever make in their lives. The last year of high school for a student is usually the culmination of years living at “home” and all that implies. In general, shelter, clothes, food, transportation, and finances are provided. There may have been chores around the house as a contributing family member. There may have been rules about what and how much TV could be watched or how many hours could be spent on the computer. There were also guidelines as to how late the student could stay “out” especially on school nights. Eight hours of sleep were built into the schedule Sunday through Thursday. The 35-40 hours scheduled in school may well have included a “study hall” or “study hour” in which students could get most of any homework done that was not completed during the class hour. Also, during these 35-40 hours the student was with his/her “friends”, students that they may have gone to school with for 12 years.

From this structured life, the 17 or 18 year old student suddenly enters a completely new life with very little structure. With great anticipation (and some trepidation), for the first time, most freshman college students are completely on their own. Only 15-18 hours per week are structured in classes and labs! Suddenly there is a whole new world to explore, all new people with whom to become acquainted, and many free hours to spend in any way the student chooses. No one is watching to see that they attend class, do their assignments, get proper sleep (especially on a school night), and eat healthy. And did we mention all that free time and no one to monitor TV programs and computer time or web sites?

In working with freshmen engineering students for the last several years, the author has observed that students who have done very well in high school may tend to believe that since they were successful there, they need little or no help in being successful in college as an engineering major. Many believe that the same techniques that got them through high school will work in college. Many engineering and computer science students may be first generation college students. They have no one to warn them that these same techniques may need some alterations. Unless a freshman engineering student has another older engineering student tell them that college engineering is quite different from high school, they may never think along these lines. In fact, even if an older engineering student tells them that engineering is “hard”, in fact, probably the hardest of all college majors, the new student may well believe that this does not apply to them. We need to recognize that most new engineering students were good in mathematics and the sciences in high school, which are considered to be the tougher courses.

The situation is also difficult for the freshmen college students who live at home. Commuting freshmen often do not spend any time on campus except to attend classes. Also, they may have tried to get all their classes on two or three days and grouped as close together as possible in order to spend less time on campus. Not until they experience two or three exams back to back do they begin to realize that having classes back to back is not a good way to absorb and to learn the material. If there is at least an hour between classes, the student can spend 15 minutes going over the notes of the last class and begin the homework for that class before the next one begins. It is also difficult to remain mentally sharp for two lectures in a row, let alone three. Another difficulty the freshman living at home may encounter is that it is difficult to study at home. If the student did very little studying at home during high school, then it may be difficult to get in the habit of studying at home. They may tend to still hang out with their high school friends, some of whom did not go to college or are attending a community college that may not require much homework outside of class. In addition, parents may have the same expectations for the college student as they did with the high school student such as doing chores around the house and yard, cutting into study time.

The reality that things are different for a freshman engineering student may first occur for those in an Honors College. Honors Students may be enrolled in a “Human Events” class and assigned 300-500 page books to be read and discussed in rapid order. This interesting, but time consuming, exercise soon competes with keeping up in Calculus, Chemistry, or maybe Physics. An English class may also require a lot of reading and writing time. In comparing their academic load with other majors in Honors, the student soon learns that there is a disparity. To learn the material in their classes takes much more time than most other majors. The courses are at a higher academic level and are usually very time intensive to really learn. If an Honors

student is on an academic scholarship requiring at least a 3.5 GPA, the student notes that other Honors students are having a much easier time attaining the high GPA. If the scholarship is needed for the Honors student to attend the school, she/he may consider changing to an easier major or mixing a few engineering related classes with some easy classes from other areas in order to continue the scholarship and still make progress on the engineering degree. (At one time, there was an understanding between the Honors College and the School of Engineering at ASU that freshmen Honors student would take Human Events their second semester of school instead of the first semester in order to better retain the student.)

If a new college student was working 20 hours/week while finishing high school and full-time in the summers, this student may think that they can easily continue this work load and carry 16-18 credits in college. They may not have anyone to advise them that if they need to work 20 hours/week, then they should not take any more than 12 credit hours, the minimum to be a full-time student. This is especially true for the first semester at a new school until the student has been able to determine what size class load he can handle.

In order to better understand engineering freshmen study habits, a literature review was made to look for clues.

## **II. The United States High School System**

Research has shown that students in the United States study harder in college than in high school, while East Asian students study harder in high school than in college.<sup>1</sup> Surveys of time use by students show the average American students study 4.6 hours per week in high school and 9.4 hours in college. On the other hand, Korean and Japanese students study 14 and 19 hours respectively in high school and 5.1 and 8.8 hours in college<sup>2,3,4</sup> An explanation of why this is so is that East Asian students study harder in high school since these students compete harder to enter better colleges than American students. East Asian firms believe that the name of the college is the best predictor of how good a worker the college graduate will be. Therefore East Asian high school students are competing furiously to get into a few top-named universities in order to secure a better life for themselves. On the other hand, in the U.S. industry pays more attention to the college graduate's GPA than from what school he/she is graduating. Therefore since there is not a lot of pressure for high school students in general to get into one of just a few choice schools, the high school student does not study that hard. On the other hand, the U.S. college student knows that industry will consider their GPA and also that the GPA is a large factor for admission to graduate school. Lee<sup>1</sup> noted that 48% of the Korean CEOs are from Seoul National University, while having less than 1 per cent (.4%) of all Korean college students. On the other hand a group of top US colleges with about .4% of all US college students produce only 19 per cent of the US CEOs. Lee also points out that the reason that American 15-year-olds are ranked 14<sup>th</sup> in science while Koreans ranked 1<sup>st</sup> and Japanese 2<sup>nd</sup> may well be just due to the fact that American high school students do not study as much.

Study after study and article after article confirm that American high school students do not spend much time studying. In "College Study Tips" by Sherrie Nist<sup>7</sup>, students are told: "You may have gotten by in high school by frantically reviewing your notes at 7:15 a.m. on the morning of an exam, but don't expect to get away with that in college."<sup>5</sup> Nist says that she has

seen “A+ high schoolers turn into 2.0 undergrads time and time again.” Nist also makes an interesting point about exam anxiety, “A lot of students who say that they have test anxiety have it because they didn’t study. Of course there are many legitimate cases of freezing up once the papers are distributed, which mostly stem from a lack of confidence in a subject you find tough.” How can students get over this type of anxiety? “Some suggestions include learning relaxation techniques like deep breathing; not participating in talking with students about the exam right before the test; telling yourself that you’re prepared for the test; and knowing the material.”<sup>5</sup> The underline is mine because the Guaranteed 4.0 Plan, which we will discuss later, is designed for the student to learn the material from repetition and putting the material into their own words.

Ed Reilly, a Counselor at Villanova, warns students: “Since you are only in class about 16 hours a week, most of your learning takes place outside of the classroom. How will you get yourself to spend enough time on task when there may be so many more fun things to do? ... ‘I got a 53 on the first test, but now I know what to expect...’ is not a good way to start the semester. Typical mistakes are to underestimate the degree to which the instructor expects you to know the material and not to test yourself first.”<sup>6</sup>

“The American Freshman Survey” is a report on entering college freshmen.<sup>7</sup> It is interesting to note that the percent of entering freshmen with “A” averages was only 17.6% in 1968. In 2002 the percentage was 44.3% and in 2003 it was 45.7%. It is commonly believed that the main cause of the higher scores is grade inflation. At the same time, the number of hours studied per week by the students is going down. In 2003, only 33.4% of entering freshmen reported that they studied or did homework six or more hours a week during their senior year. In 1988, 8.5% of entering freshmen admitted to studying less than one hour per week. In 2003 this percentage increased to 15.9%. Researchers are not sure how technology fits in with these reports. Are American high schoolers using computers to complete their homework in less time or are students spending more time on a computer and so have less time to study?

Another survey, the National Survey of Student Engagement, also has found that college students don’t study nearly as much as professors want.<sup>8</sup> Rick Hesel says, “There is a sizable and mounting body of evidence that a good part of the senior year is a total waste of time, largely because so many students pay no attention to academic matters once they get admitted to college....The colleges, for their part, virtually ignore the second semester high school grades and performance.” Good students may also have completed most or all of their required courses before the last semester of high school, again helping to lull the student into doing little or no homework.

Another factor why college students may not study as much as they should is that many of them need to work while going to college. “The American Freshman: National Norms for Fall 2004” reported that 47.2 percent of new college freshmen had a “very good chance” that they would need to work to help with college expenses. In 1989 only 35.3% of freshmen college students expected to work in college. In this latest poll, 6.3 percent of the incoming freshmen expected to be working full time. Very interestingly, 53.3 percent of freshmen college women planned on working compared with only 39.6 percent of men.<sup>9</sup>

### III. Student vs. Faculty Study Expectations

There is a wide disparity between the study expectations of college professors and those of the college students. The National Survey of Student Engagement<sup>8</sup> showed that “studying and preparing for class is not on many students’ list of things to do.” Ron Kavoc, an information and communication sciences professor at Ball State, whose students tend to study less than other Midwest public universities, says that his students “often come to class unprepared and expect him to spend class time reviewing what they should have learned beforehand.”<sup>10</sup> He notes that students who complete outside assignments and come to every class generally do better than those who do not. He adds, “It’s a free country and students have a right to fail. If they don’t come prepared, they probably will fail.”

The author has experienced this same problem of unprepared students in her teaching. In a course she is currently teaching, it is clearly stated on the syllabus for a junior level statistics course that the best way to prepare for the course is for the student to read ahead on the material to be covered each class period. Students, in general, do not want to hear this. In fact, a student wrote on the course evaluation under “what was not good about the course” that he was not happy about the course because he was expected to take his text to class! Sometimes problems given in the text exercises are worked out in class. If the student has his text, then class time does not need to be taken to copy down the whole problem. Textbooks in class are particularly valuable when instruction is being given on how to read statistical tables to solve problems.

It is interesting to note that in European Higher Education, the European credit system is all about “credits set according to a student’s work inside and outside the classroom, working on the basis that the average number of hours of study which a student must put in to pass a year should lie between 1500 and 1800.” A scheme now used is based on 40 weeks x 40 hours of work/week = 1600 hours.<sup>11</sup> Garmendia et. al. showed in their study that the number of hours of studied per week depended upon how often the students had an exam, with the study time spiking for two-three weeks before every exam.

Soulsby<sup>12</sup> pointed out in 2002 that the engineering students are different now than they were a decade or two before. Undergraduate students used to be serious and give good academic effort, while undergraduates are now into football, fraternities and sororities, drinking, and campus fun, and resistant to serious demands from faculty. Many students work and many take more than four years to graduate.<sup>13</sup>

Bradley and Bradley point out that the gap between student and faculty study expectations should not be surprising if we consider that in high school the students spend about 30 hours in class per week and about 5 hours of study outside of class.<sup>14</sup> In college students spend about 15 hours in class (plus labs) and are expected to study at least 25-30 hours. College students are then expected to spend 500% or more time “studying” in college than they did in high school.<sup>14</sup> Other studies confirm that high school seniors do not study many hours outside of the classroom.<sup>15</sup>

It is interesting to note the characteristics for “The pedantic 21<sup>st</sup> century freshman engineering student” described by Mina and Gerdes<sup>16</sup> based on a study of freshman electrical engineering students at Iowa State University. These freshmen had been exposed to extensive amounts of computer time in junior high school and high school. These students spent countless hours looking for something new and exciting by using the computer for learning, gaming, e-mailing, chatting, and web browsing. Through one-on-one interviews, group dialogue, classroom discussions, and “fastidious observation”, the authors discovered common traits and behaviors. Among their findings are several items that are particularly pertinent to our discussion on study habits, including that students are unwilling to accept challenges. When learning becomes difficult, the students are likely to drop the class, change majors, change schools, or just quit. Other characteristics are: students do not have respect for, or understand the necessity—and function—of an authority figure; unless a class is “fun” the students are unwilling to maintain a committed interest; the students lack personal mastery; they lack an understanding of the meaning of hard work; they believe that there is always someone better than them, no matter their efforts; copying from the web is not plagiarism; access to information, via the internet, is equivalent to knowing; a disproportionate amount of time is spent on e-mail/chatting; the students lack an understanding of the learning process; rather than endure adversity, the students change the game in mid-play; student do not seek to find understanding, only answers; and mistakes are not an option, but the students don’t know how to win.<sup>16</sup> The authors state that they believe it is beneficial to the freshmen students to point out these characteristics of themselves so they can better understand their behavior.

The different views of the professor and the student are nicely summed up in the following two quotes:<sup>17</sup>

“I think the professor expects too much from freshman. I’m sorry, but we’re not as smart as professors seem to think. They don’t seem to realize that we have other classes, too. They just keep piling on the work. If students don’t understand it, too bad. They don’t care.”  
--Freshman student

“It’s the passivity of freshman that gets to me. They don’t do the reading; they wait for me to explain it. If they don’t understand, they blame me. It does not seem to occur to them that they might have to work at understanding, that it might involve some effort on their part.”  
--Faculty member

These two views make sense if we consider again the amount of time the freshman spent studying in high school, with a small percentage of them spending more than six or more hours per week. The college freshmen expect that they will have to study more in college and many do—surveys show that college freshman study about two hours at night or about one hour outside of class for each hour in class. So the freshmen are studying about 16 hours a week, more than double the 6 hours per week that they studied (at most) in high school. However, professors expect college students to spend two hours out of class for every hour in class<sup>17</sup> and engineering professors expect a three to one ratio. Bette Erikson<sup>17,18</sup> notes: “Few freshmen can keep pace with their courses if they study only one hour between classes and if their only study activities are reading, highlighting, and copying over notes. Faculty expect more, and those who

teach freshmen play an important role both in making expectations about college work explicit and in helping freshmen develop their study skills.

#### **IV. What Can Be Done?**

What, then, might we do to get students to spend more time studying and to study in more productive ways?"

Erikson<sup>17</sup> suggests that one way is to do a "Survey of Study Activities" to have a quick way of monitoring what students do when they study and how much time they spend. Erikson suggests doing the survey early in the semester and then presenting the facts to the students and having a discussion on student expectations and professor expectations. The survey could also be given one or more times later in the semester to help motivate more study. There are many techniques that have been suggested including Productive Study-Time Logs, Punctuated Lectures, Process Analysis, and Diagnostic Learning Logs.<sup>19</sup>

Soulsby<sup>12</sup> describes special class sections of a University Learning Skills course for engineering majors. An emphasis of these special courses is "essential study skills" to provide the students with the necessary tools to "bridge the gap between high school study habits and those needed for success in rigorous programs like Engineering in college."<sup>12</sup>

"The Engineering Student Survival Guide,"<sup>20</sup> used as a text in the Academic Success Class has been found very useful to freshmen by their own reports. However, although the text, as well as many other such "survival" guides, gives a lot of practical advice through warnings and possible solutions to problems, there is no actual time management plan with instructions on how to include all of the things that you need to do to learn the material in the classes.

One set of researchers<sup>21</sup> determined that teaching "how to study" is not as effective as teaching group study. They believe "the focus should not be simply teaching study skills, but rather teaching group study habits and enforcing this group activity". The Virginia Tech College of Engineering Fall 1999 class of freshmen had an average SAT score of 1224, an all-time high.<sup>22</sup> However, the average GPA was 2.49 at the end of the first semester. In a study to try to understand this, Cummings and Knott<sup>22</sup> found that the students who took heavy loads (greater than or equal to 18 hours) had a higher GPA. Overall as the number of hours attempted by each student increased, so did the average GPA. A limitation to the study was that the number of hours attempted were the credit hour loads after the course drop period was over. An experiment in Spain showed that using final year or postgraduate students with specific training, made a difference with the freshmen students that they tutored for about an hour and a half each week on basic issues such as personal, positive academic habits, study skills, and planning and time management.<sup>23</sup> The first-year students were in civil engineering, economics, pharmacy, and chemical engineering. The showed a higher GPA at the end of the term compared with a general group and a control group. This effect lasted for several semesters.

A successful experiment was run at Baylor University which improved the GPA and retention of students taking the introductory freshmen engineering class.<sup>14</sup> All students (90) were required to attend a "Success4Students" seminar in place of the laboratory the first week of class. The



students were then encouraged to complete 12 weeks of Internet follow-up to get three points of extra credit on their semester average. A control group of 90 students did not have this additional instruction. The groups were equivalent in class rank and SAT scores. The intervention group showed higher GPAs and retention. Several similar experiments have been run, all with the same good results. This program includes principles such as: sitting in front of the class, staying current in your understanding of the class, listened actively in class, reviewed notes before class, attended class, followed weekly schedule, updated daily schedule, used reading techniques, prepared schedule prior/early in week, paid attention to total hours spent in class and studying, used memory techniques, treated school like an 8-5 job, read book before material is covered in class, paid attention to hours of sleep, and used note taking techniques.<sup>14</sup>

The principles of “Success4Students” are very similar to the steps in the “Guaranteed 4.0” learning system created by Donna O. Johnson.<sup>24</sup> The “Guaranteed 4.0 Plan” is the only learning system based on research that guarantees the student, even a college engineering freshman, that if they follow the entire plan, they will get straight A’s. In the next section we will discuss the 4.0 Plan as a partial solution to what can be done.

Of course, there is another way. If more high schools were like Malden Catholic High School, it would not be as difficult to motivate college freshmen to study more.<sup>25</sup> This school “provides an environment that encourages students to excel in all areas of their education.” Their Freshman Study Guide warns: “The first year in high school is critical as freshmen are exposed to a new academic culture, new friends, new teachers and a different way of learning.”<sup>16</sup> Much of their advice on studying is similar to the Guaranteed 4.0 Plan, including getting enough sleep. Malden freshmen are told “Study is hard work. If you aren’t working hard, the chances are that you aren’t really studying. Education without sore muscles isn’t worth much...At least ten hours of sleep, good meals... Don’t expect that all subjects will hold a natural interest for you. Interest results from effort of the will – and it can be developed in any subject. Your interest will increase in direct proportion to the amount of effort and study you give to that subject...Make school as all-out effort, a vocation in itself.” This guide goes into much detail on taking class notes, places for study, getting the most from reading, strengthening the memory, a method of study, how to prepare for examinations, and how to take objective and essay tests. How much “studying” at night is required? The high school freshmen are told “Plan on about three hours each night to be set aside for study. If a given evening’s assignments require less time, use the balance for required or extra outside reading.” The students are urged to get in one hour of study before supper on the easiest written homework. “Then only two hours or so would remain after supper.”<sup>25</sup> The students are also told to have a definite time for study and to begin promptly at the designated time.

## **V. The Guaranteed 4.0 Plan**

In the Fall of 2003, the author began teaching Academic Success Classes to first-time, full-time engineering and computer science students in the Ira A. Fulton School of Engineering at Arizona State University. Henceforth in this paper, “engineering students” will mean both engineering and computer science majors. The author taught or co-taught a two-credit hour Academic Success Class to freshmen in the fall designed for underrepresented minority students with

National Action Council for Minorities in Engineering (NACME) scholarships as well as other students who had attended the Minority Engineering Program two week summer program. The goal of the Academic Success Class, which had an emphasis on underrepresented minority and women students after the first year, was to retain the freshmen in good stead for the sophomore year. The students were taught time management. Not only were the students taught study tips and given help on writing a resume, but the mere fact that the students met together every week their first semester helped the students cope. The students did a small team project during the semester (incorporating the group work principle). At the beginning of the meetings, the students were often asked how they were doing academically. As a student would hear another student say they were struggling in a particular class, they would be encouraged to know that they were not the only one having problems with classes. Sometimes study groups would form among the students in the class who happened to have the same class.

The author has surveyed the freshmen in the Academic Success Class for several years to learn how many hours they studied a week during their last semester in high school. They are then asked how many hours they planned to study per week this their first semester in college. Next the student was asked to give reasons why they might need to study more this semester as a freshman in college. The students could easily give reasons: the material was harder, their family was paying for them to go to school and to do well, or they had a scholarship which required a 3.5 GPA to continue the scholarship. The students in this class all had at least a 3.0 high school GPA, but many of them had GPAs much higher.

Most of these freshmen college students had studied 0-2 hours per week during their last semester in high school, spending an hour or two if a big project was due. On the other hand, some might spend an hour reviewing material if they knew that there might be a quiz the next day. Many students reported 0 hours per week studying outside of class, with an average of about two to three hours per week. A few students reported 6-10 hours or more. With the Academic Success students not being used to having to do much study in high school outside of class and having gone through a two-week summer program to prepare them for the beginning of college, generally believed they knew everything there was to know about college. As a consequence many of these entering engineer freshmen did not put in the time to learn the material in their classes until they hit the first quizzes or midterm and suddenly realized that they have a lot of learning to make up to be on top of the class material.

After the first two years of the Academic Success Program, the evaluations reflected a deficiency in the program. The students reported that the Academic Success class did not help them with their academics. The students had not learned or been inspired by the time management helps, nor a series of videos on “How to get an A”, to take the time to learn the class material. The students, in general, did not know how to “study” effectively. As a remedy to this situation, the author has taught Donna Johnson’s Guaranteed 4.0 Plan to freshmen and other engineering academic scholarship students every semester for four years and has seen the change that can occur if a student takes this learning system seriously.<sup>26</sup>

The Guaranteed 4.0 Plan developed by Donna O. Johnson<sup>26</sup> was first taught at ASU in spring 2005. One student who had earned a 2.4 GPA during his first college semester, earned a 3.9 his second semester following the 4.0 Plan! The Guaranteed 4.0 is a simple brain-based learning

system to help students learn how to learn based on repetition and putting concepts into their own words. The plan consists of seven steps: Bullet Point Reading (BPR: reading the material before it is presented in class and putting main concepts into 3-5 of your own words), Attending Class, Bullet Point Notes ( BPN: right after class, take about 15 minutes going through the notes just taken in class and putting the main concepts in bullet points of 3-5 of your own words), Home Work (HW), Professor Office Hours (POH: .5 hour per week to visit each professor), Bullet Point Concepts (BPC: go over graded homework and quizzes to make sure they know how to do each problem correctly), and keeping a Bullet Point Notebook (all BPR, BPN, HW, and BPC information for each class is kept here and carried by the student at all times).<sup>26</sup> There are also rules that go with the system such as 8 hours of sleep each night. The sleep is necessary in order to be effective in the time spent learning.

The students are asked to make a detailed time management plan, accounting for all 168 hours in each week. The word “study” does not appear on the time management plan. In this plan the student needs to include time blocks incorporating all of the steps mentioned above, with only one activity in each time slot. For example, the student can schedule Home Work or lunch, but not both in the same slot. According to the 4.0 Plan, instead of needing 45 hours to study per week (3 hr/credit x 15 credits), the student can learn the material in 25 hours because their time is used very effectively. Often students will make a plan to study about 15 hours a week and need to be urged to schedule at least 25. Most serious students report that they need 30-35 hours of “learning time” per week.

The Academic Success students are asked to do other assignments to help them see if they have a balanced schedule with the 4.0 Plan. These assignments include looking at the total number of hours per week set aside for sleep (56 is mandatory), BPR, BPN, POH, HW, and BPC). They are also asked to make a matrix of their courses and the 4.0 Plan activities and show how many hours they are spending on each of their classes for BPR, BPN, HW, and BPC. This matrix of times may suggest that too much time is being given to a particular course and not enough time to another.

The author directs three academic scholarship programs which have six meetings per semester. The first meeting of each semester is devoted to going over the 4.0 Plan with the students. The second meeting includes information on how to catch up in a class if they get behind, also from Donna Johnson’s book, “The Guaranteed 4.0”. The Fall 05 freshmen students believed that the 4.0 Plan could help them. As a class of 21 students, the average grade at the end of the semester was 3.6. Only one student had a GPA below 3 and that GPA was 2.9.<sup>2</sup> However just because a student follows the 4.0 Plan and does well academically one semester, does not mean that they will do well academically the next semester unless they recommit their time management to following the 4.0 Plan or some similar plan. Recent Academic Success Class freshmen students have not believed that a 4.0 Plan works, or more accurately, that they needed such a plan in order to continue to receive good grades. The students admitted that they thought the plan was a joke and snickered among themselves that they should be expected to embrace, or would possibly need, a plan to ensure that they would get all A’s their first college year. This attitude usually did not change until after the first set of exams, which do not go well. This attitude of not needing any help seems more prevalent now than a few years ago.

When the author compared the Academic Success Class of students, most of whom had gone to a two-week Minority Engineering Program the summer before they began as freshmen, with students who also attended the same summer program, but who were not in the Academic Success Class, on average the GPA of the Academic Success Class students was one grade letter better at the end of the first semester. This increase in grade is confounded with both the Academic Success Class and the Guaranteed 4.0 Plan. The students who learn the 4.0 Plan know how to use their time effectively in learning the material for their classes. It is then up to them to execute the 4.0 Plan. The 4.0 Plan is unique in that while there are many tips available on studying and how to get good grades, this is the only system that is guaranteed. The creator of the 4.0 Plan, Donna Johnson, has given hundreds of seminars on her learning system. She guarantees the students that she teaches that if they follow the 4.0 Plan 100% and do not get straight A's, she will give the student \$100. Donna has never had to pay out even one \$100.

## **VI. Why Don't Students Go with a Guaranteed System?**

As we have discussed earlier, many first semester freshmen, used to earning A's with little or no effort in high school, are convinced that they do not need any help, let alone a system that dictates a lot of their time. They believe that the "Guaranteed 4.0 Plan" is a joke. Many students say that the system is too stringent for them – they feel bound, they need to feel "free". Some students say that time management is difficult because there are too many interruptions. The students are reminded that their schedule is not cast in concrete. Their detailed time management schedule is on the computer and they can adjust the times as they learn how much time each course takes. Actually the detailed time management 4.0 Plan, should reduce stress for the student. If they suddenly have a larger than usual assignment, they can look ahead on their weekly schedule, which is mapped out for all 168 hours of the week, and see "white space" to use in order to get caught up. This "white space" is time that has been set aside for social and relaxing time. The schedules usually include over 20 hours for socializing, some of which can be used for the sudden "big assignment".

Other students are convinced the 4.0 system will not work for them. One student, for example, said that she tried the system for two weeks and it just didn't work. She had a very busy life, but would not try the system again and struggled to graduate with a 3.0. Students need to be reminded that a habit takes at least 3 weeks of strict repetition in order to become a habit. Discipline is very difficult for some students as discussed earlier.

The BPR does take a little time to learn how to do, but students who stick with this system report that although they are putting in more time upfront before they attend a class (most students do not read material before it is presented in class), say they are saving time over all. By having to BPR the material before class, they have already gone over the material several times and so the lecture is much more understandable. Since the student has read the material and digested it through the bullet points, he/she can know going into the class what areas were the most difficult for them to understand. If this material is not cleared up during the class lecture, the student can raise their hand and remark, "I have read the material over before coming to class and I didn't understand the 'x-factor'. Although you just went over this material, I still don't understand it. Could you please explain it another way?" In general, a student who has not read the material ahead would not be able to tell on a first pass of material in class whether a

particular concept is a difficult one or not and therefore will be reluctant to ask a question in class for fear the subject is trivial.

Students report that if they have BPR the material before class, taken good class notes, BPN right after class or as soon as possible, and then started the HW right away, they can usually sail through the homework because they already understand the material well. Many students only start to read their text after they start the HW and are stuck right away.

Students who have followed the 4.0 Plan all the way report that they sailed through finals with very little stress and very little or no “cramming” before finals. They got a good night’s sleep the night before the final because they “knew” the course material. The students were in this situation because they had learned the material from each class session as they went through the semester. Some students report that the BPR and/or BPN plus the POH are the most important parts of the system. Students report that, without following the 4.0 Plan, they ordinarily would not have gone to talk to their professors and that the professor time was very worthwhile in terms of learning the material, getting help when they needed it, and in getting good recommendation letters later.

A student often starts a semester with great intentions of following the 4.0 Plan. However, soon a few crises arise to change the intended schedule and the student is off track. Without a plan for catching up when they get behind (taught during the second meeting of a Success Class each semester), the student may well give up being on the 4.0 Plan for the semester. At the beginning of the next semester, a student has the chance to try again to follow the Plan and to keep up with all of his/her classes.

## **VII. Conclusions**

In this paper we have discussed what surveys and studies tells us about the study habits of American high school seniors and college freshmen. We have discussed the difference in the American and Near East cultures that dictate whether students study harder in high school or college. We have discussed the disparity between the expectations of college professors and college engineering freshmen. We have discussed several programs that have been successful in improved GPAs and retention. We have also discussed a guaranteed learning system that works if students will follow the plan and why it is difficult for students to follow such a plan.

Perhaps the best solution is to continue to give the students more evidence and reminders about the value of learning to learn. Perhaps they need more of the general information about study hours that is contained in this paper. Perhaps they need to hear directly more about the experiences of freshmen, similar to themselves, who went before them and had to learn the hard way about the importance of following, at a minimum, the general guidelines contained in the 4.0 Plan. Perhaps they need to be reminded more often that habits are not formed unless they have been followed faithfully for at least three weeks. Perhaps part of the solution is to better present the goal of an engineering undergraduate engineering education: to have the student learn how to learn. Having only had the experience of professors spoon feeding them new ideas, will not equip them as creative engineers who can solve new problems.

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