

Scott: okay, SO I am really happy today because we have Cal Newport here, the author of “How to become a straight A Student” and Cal’s really interesting because he is an MIT PhD graduate. And you assertively got started in writing books because you noticed that a lot of the people who are, graduating top of their class were the same people you are seeing enjoying college life not always in the library studying nonstop, and you decided to research that, you decided to pinpoint what were the things that they were doing differently and how they studied to be able to get those results that normal students who are studying excessively were doing and I did the similar set of researching. We both had similar conclusions on a lot of things but you also uncovered some different things, so I want to highlight some of the research that you've come up with at that time that you were writing that book. Maybe you could explain a little bit about that process.

Cal: Yeah, what happened with me was I started college as sort of the normal reasonably hardworking student scoring the sort of normal, average, above average type grades and I did something different. I took a period about one semester was the fall semester of my sophomore year and I said “OK, why not actually study my study habits as if I am a test subject like how would a scientist of social scientist actually study habits for producing grades so I systematically went to all my habits from time management, how I took notes, to how I wrote papers and kept the work, how to get in it, tried to optimize what did work, and the end result was I got 4-0 in every semester starting from starting that sophomore fall until I graduated . And, I did it working less than most of my peers; the time tumbles down as my academic rose. To be honest I got more and more efficient and, what made me want to write about it there’s a little sort of a little known elite, elite group of high scores that most of at least the American Universities and this is a subclass of the Phi Beta Kappa award winners, there’s a subclass that get the distinction early so at the end of your junior year, your grade point average is so high that they know that you are almost definitely have Phi Beta Kappa at the end of your experience. So they do a special induction, and so for example the term where I was and there were 30 of us it was sort of 30 top scoring students out of the class with thousands and that are what where I had that experience, you were talking about that that I locked into this place at the absolute most elite 30 highest top 3%, the 30 highest scoring students over a thousand that’s where I recognized people from the frats and from the magazines I worked for and people that were not particularly stressed. So, it’s true that a lot of the students getting A’s, work incredible working hard and really stressed out but the very top, the very highest scoring students tend to work efficiently less than to those, and I wasn't alone in that experience and once I have that epiphany. Hey, I am not alone in the fact that the very highest scoring students who study less like I did research. These systematically write a book about it, and then that's what’s started to have a path that turned into a book in the end.

Scott: So, what were the biggest insights? So, you actually went through and study always people, kind of observed what they were doing. I remember you said that what you tried to do is not ask them what they thought other people should do for studying but to actually observe what they actually did. So, paying attention to not what they think matters for studying but what their actual behavior are, and so

you were able to abstract in a lot of ways, in a lot of the is actually effective in terms of getting the grades you want in studying. If you could explain a little bit of what were the couple of the key insights that you have found in this process?

Cal: yeah, that's right so I give a survey that asks for specific habits not opinions on what they study for the last test, how did you write your last paper? 50 students all Phi Beta Kappa, early inductees from some of the top schools, 3 biggest ideas came out of that; 1. The value of the work produced is a product of the time invested and the intensity of the work, which is little understood. Right, so think about as the multiplicative relationship that means if you're working with high intensity in a very small number of hours you could produce a lot of value on the other hand if you are working with low intensity you can work a huge amount of hours and not actually produced that much work and I called that shadow working. So the elite students work with very high intensity that cuts out the number of hours until they can control their time right. They have a very good sense of what am I do with today, and what am I going to do when the weekly, monthly scale. Okay, I am getting to start working with this paper; this day two weeks in the future and I got to start studying for the exam on this Saturday when they get to a particular day and they understand what they're doing in the different hours, they will never just say I should start studying and three the gospel act of recall. The only way that these students would ever try to study for something is to replicate the information from scratch without looking at their notes. It is incredible demanding to do this but it's incredibly time efficient, right? If you can do it once it stocked and you can move on into something else. Those are the sort of the trinity, the whole in trinity to get early Phi Beta Kappa without ever pointing all night.

Scott: Right , in your book you are going to a lot more detail obviously on these three Tennessee and I think these are also things that I have explored maybe in perhaps slightly different ways in my own work that I sort of independently supplied with this kind of ideas. And one of the that you've talked about is the idea of active recall and this is something that actually not even just your sort of book research assessment of the students in my own sort of informal assessment but a lot of the psychological research has been done learning and showing that this active recall approach is more effective for generally long term memories improving, studying outcomes than passive recalls so we talk about the active vs. The passive; active being exactly what you describe which is when you are prompted and then you have to generate the information that you are trying to remember as supposed to recognizing it by reading notes or covering a material while doing something like that. And so, you developed a couple of methods or you found a couple of methods that work really well for generating exact recall. One of them was the quiz and recalls the approach so maybe you could talk a little bit about the quiz and recall approach.

Cal: Yeah, so I mean I think you're what you found exactly what I found, if you are using the highlighter you are already screwed, right? Just sitting there reading over your text book and just hoping that things

stick, that's incredibly a low intensity high hours of studying, that is actually the worst thing that you could do so active recall works better person recall approach active recall is just a simple strategy that a lot of students I interviewed did was they basically reduced every topic that they needed to know potentially for a test into a quiz format. There are basically questions they had answered such as the collection of all those answer covers all the material they need to know for a test. So you would simply be squeezing yourself and see if you could reproduce the answer from scratch from without looking at notes. What's efficient about with recall is that you start with this long list of quiz questions and you go through them and you might not just dissolve in one session but then you mark all only the questions that you got wrong, you could actually recall assessed the factor answers from the scratch, on your next path you just did the questions that you marked and then next path will give you more of those only smaller numbers will be left that you failed about and you mark those, on your third pass you only work it on those questions. This is a of course way more efficient to the standard approach which I have gone to passively review my material as many times as possible, so you are going through all the material to passive recall multiple times which is incredibly time wasting with an active recall using the quiz recall strategy you honed in incredibly quickly exactly where you are having issues that's the whole energy goes.

Scott: so interesting what you're talking about the quiz recall because this is something that I've talked about in my finding that one of the really big helps if you are trying to study is if you have practice exams and this is especially for quantitative subjects because you could have often you could study subjects who are not realizing exactly how it will be translated in terms of problems if you're dealing with physics you might, understand the principles of like thremotism. But then the problem that you get is going to be somewhat novel it's going to be something that you see before you are going to have to apply the principle towards it. And so having practice problems, practice exams, is really good because you get to see okay this actually how they are going to test me, how good am I doing on this reasonable proxy for the test. And whenever I've had the ability to get an old exam, practice exam those would've always golden for me but one thing that is interesting that I've that I found in this was in a psychological review of different learning tactics was the even if you make your own quizzes, you make your own questions and then you quiz yourself on them so if you went through the, when you're going through your notes you just make questions for everything and then you quiz yourself later on those topics as you exactly so with the quiz recall. That was also really effective for generating that sort of long term memory and retention outcomes and that is something that you can do even you don't have any material, I mean material such as practice exams or those assignments with solutions that you could really use to get. Specifically this is what is going to be on the exam if you generated your own exam, if you generated your own practice exams and that would be an effective strategy for studying.

Cal: That's true, in fact I would say that 99% of my studied per example was with the quiz recall method by the question. For me the practice test for the final tune up like mainly like a confidence builder. Okay, like let's say two days before the exam I've done my quiz recall study on my questions that I've written to cover up a material, now let me do the practice exam and by doing well on the practice exam that would give me the confidence that okay I can stop studying with that become and allowed me to should never work beyond 8pm at night, the confidence that allowed me to not be able to go to the movies during finals period so you're absolutely right. If you write the questions through yourself along with your honest and answering it them, if you're doing it loud complete sentences of lecturing in the class, don't let yourself off the hook, if your mum bullying or saying something that it doesn't make sense, you don't have the answer, you can use this for non-quantitative subjects. When I was at art history minor, I used to do quizzes recall on basically an essay prompts and I would write an essay and I would check it to get four key points for supposed to be. And, this was so effective that when I was actually taking the blue book exams in Art History class I was often able to basically remember full phrases or paragraphs of these answers that I had from before because active recalls the mainstays in your brain so effectively so I would just dominate this non quantitative classes just as effectively just like boom, I know all the points, I exactly what I need to say, and all that was on my own questions.

Scott: So one topic this is actually an idea of yours that I integrated in the course because it was something that students found very effective is the compliment to my weekly, daily goal system was your fix schedule problem productivity so I thought now that we have you on the call right now maybe you could talk a little bit about what fix schedule productivity is, how you use it both in your working life and life as a student or to get more done, how to preserve your overall sanity?

Cal: Yeah, so fix schedule productivity is an approach to scheduling that I've used for years and my life after being a student and that's where I set limits on my day, this would my day begin, this work in, and I work backwards from that. They tried to make everything fit so by working top down. Okay so these are my limits now and I have to work backwards to make them fit, it foresees a lot of various smart productivity decisions so it says no more than things to start more things earlier and more efficiently. Now for students I think the variation of fixed schedule productivity that make sense for students is something that I called the auto pilot schedule and that's where you take all of the regularly recurring work in your student lifestyle so you have prom set's that always do on certain time every week, you are reading assignments that are always done in a certain time every week. Anything recurring and you have the time decide for working on that during the same hours on the same day so you never have to think about. Tuesday morning from 10-12 I do my reading assignments for this class, I do my first half of the problem set from 4-7, Thursdays and then I finish it from 9-11 on Fridays. You make that all automatic, once you figured out how much time you need, same time, same day every week you get rid of all that sort of planning, thinking, and allows you to get the bolt of your work done without having to extend any sort of scheduling willpower, right? This is just where I do this work, I do it, I execute, that works phenomenally well especially at the college level.

Scott: SO what would you give us advice to someone who is maybe not in a classroom environment but they want to get better to a particular skill, they want to learn something more effectively what is your thought about that, because you have not only done certain undergraduate graduate study, you are now engaged in high level PhD Computer Science research so you've learned a lot of different domains also on your own in order to compliment the research you're doing maybe give us some thoughts on you've found effective in that process.

Cal: Yeah, I think that the 2 things that keep in mind is; 1 you have to be comfortable with being uncomfortable absolutely the right metaphor is body building, If you came across in this firing body builder who said, I really want to be muscle bound but I just never want my muscles to burn, I just don't like feeling that my muscles straining so I am going to avoid that they're and not going to be successful as a bodybuilder maybe you have to strain. The same thing is through cognitively active recall which is a fantastic strategy for burning cognitively demanding test is hard but that's good, that strain you feel in your brain, that strain that says you stop this right now and go check your Facebook page is the same as the muscles strain for the bodybuilder that's when you are actually laying down doing violin that's what you are actually cementing knowledge. So you have to become comfortable with being uncomfortable, those who are comfortable that seek that are able to pick up skills much quicker, the natural portulary is that you really have to worry about your capacity for focus. If you have an inability to focus in a sustained way on a cognitively demanding task, you are going to be unable to pick up complex skills quickly and I think the right way to think about focus is that it's a skill. I like to use the metaphor of pull-ups, it's a skill that you are going to need to understand but you will not be able do much of if you're not training. So, especially if you're from a younger generation. I am right on the path, I mean I went through my undergraduate experience without a laptop or a cell phone so I still have memories of doing cognitively demanding things before it was used to being destructive. But, if you're, even just a little bit younger than me you may have a lot almost no experience outside taking a standardized test without being forced to do something demanding without distraction so you probably have to train, and you have to train that capability like you would muscle, like you would do if you're going to do pull ups because discomfort is the pre-condition for learning and in order to sustain uncomfortable concentration you have to actually practice that capacity.

Scott: SO it's really interesting pointed that out because this is something that I know we've talked about before but there is, there's a really popular psychological concept known as flow which was I am going to mispronouncing me and hollieskidpollary.. I can't pronounce it, it's always a hard one, and it's always the one that I copy and paste instead of typing on the spreadsheets. But he did a lot of ground breaking research on this idea of flow, which was the sort of very pleasurable cognitive state which kind of, something it's not too hard and not too easy sort of Goldilocks is known. And I think what I thought in my learning which is goal against the common wisdom is a lot of students feel that if they're

not in a flow with a particular subject. If they are not learning something in this kind of effortless the ideas just sinking into their brain and it's very easy then they're doing something wrong, the discomfort or that anti-flow, that things are just too difficult, they're a little bit too frustrating that people, a lot of students who contact me saying that " what like I am feeling this I am doing something wrong, it shouldn't be like this" and I think what your experience, validates in my experience validates is that now that learning is in some ways is anti-flow. The flow is good when you have accomplished certain of level of skill and performing a task like I think that there is definitely there been at times that I'm writing exams . That I've been in a flow state because the exam is below that difficulty threshold but when I am learning new things, when I am pushing my abilities beyond they are right now that it's often not a flow state, kind of frustrating. It requires focus, and a little bit of sustained tension but you've pointed out this higher intensity anti flow kind of strategy is ultimately the one that gets a lot more learning done in a lateral period of time which how a lot of these students who've performs so well avoid so much in the library or to learn a subject.

Cal: Yeah, flow is the reward for having mastered the skill, that's the reward for I play guitar. It's a lot of fun to play a song how to play on stage with the band, that's a lot of fun but it's not fun to learn that song, yeah! That takes work if you have to pick up the new picking technique and I used it as an example specifically because for my most recent book I actually spent time with the professional guitar players. And, I could tell you that it is really hard to get better to pick -up a new skill and they have a great time performing. Flow is a reward for picking up a skill but mastering that skill is uncomfortable and I think this is a problem especially now in an American educational system. There is an idea now around a passion for learning sort of Ken Robinson speech on the Ted speech which is popular for example. And the problem is that person's good intention are misinterpreted like "Oh, yes I want our students to have a passion for learning" but they interpret that meaning that they should enjoy or always be enjoying the process of learning and if they're not then it is not going to be something that they'll enjoy and they'll have no passion for learning and because of that we are allowing students to not develop, not festive develop the sort of muscles required to do that most difficult task of all. I like the point of the example of thinking about some of the greatest and most famous speaker, and lovers of learning in the history of the world, think about the usual American example of the framers of the constitution, like John Adams or someone like him. If you go back and look at what their educational experience was like, they are in a one school house being forced to memorize Latin and having their hands hit with a stick like a giant ruler if they got something wrong or didn't pay attention, should be the opposite of this, we should always enjoy learning but mastering Latin they could resist by reading, they could write the constitution. So, I think we are mixing up the motion of what is the meaning to love knowledge versus what is mean to actually love the process of learning.

Scott: I think to continue that example because you're viewing the body building analogy already in this context and this is something that I fully agree with as well that there is definitely a lot of parallel flows between this intense physical development of muscular development and cognitive development when you are learning the skills. There are different types of discomfort certainly but there's a lot of analogies between them. One thing that when you are going to be bodybuilding, what you quickly learn is the difference between good, and bad pain. The good pain is that muscle soreness that comes from correctly executing an exercise with proper form with a strong amount of weight to muscular fatigue and that is training the muscles to increase the strength the musculature and, that worst pain is when you are executing a technique with incorrect form or bad momentum in your causing joint damage which can cause you problems lifelong. They are both types of pain or different types of discomfort but most people I know who do body building are quickly distinguished which is between the two that this is a kind that promotes growth and this is the kind that doesn't promote growth. I would say that in a lot of ways there is a similar parallel with cognitive development that there is definitely I think a good pain associated with something that is frustrating but you are inching to it or moving through. This kind of thing whereas a lot of students and that depth taking I would say kind of bad pain approach where they got a particular subject studying and they are using really inefficient methods to go through it, they are doing passive recall and they are paining their selves and they are not giving the answers. Maybe it's not as intense pain in the moment but definitely a worse pain overall because if anybody who spent 2 hours in a library is not just a fun experience. I think that there is a parallel there as well with sometimes that discomfort if you are applying directly and you are getting results, that can be enjoyable which I know a lot of people that are interested in lifting ways and I think that they're also people really interested in learning that have a similar experience that when you see the process of mastery working. It does become enjoyable but in a different kind of way than people are used to, and that requires training to get adjusted to.

Cal: Yes, and in the context of student life the phrases I use to capture that news is the difference between hard work and hard to do the work. Active recalls hard work but when you are actually doing it, it is demanding but if done right and not done for too long as part of the schedule that gives you plenty of time for recharge just like body builders spend most of their days eating protein and recharging, that actually lift the muscles, it is energizing, and you might come in a way that it is mentally exhausted but not emotionally exhausted or you are not unhappy if anything you're excited about what you learn in the progress you make. Hard to do work is when you are working 12 hours at a stretch for pointing highlighters. You've come away emotionally exhausted not just mentally exhausted, you feel physically exhausted, unhappy, overwork like you are kind of burnt out, and that is hard to do work which is not sustainable. That is why one of the most counter piece of advice that I give if you want to be a star student is that you do less with the same that the body builder would say that you have to lift just the right amount of time with the right intensity then go sit on your calf so muscles can develop. I tell the best students do less, don't double, triple major, don't sign-up for nineteen twelves, your courses and you do them well, you attack them with active recall, and you leave yourself plenty of time around

to recharge. That is when you are doing a hard work but it is not hard to do, it's just part of an actual pretty relaxing and fulfilling lifestyle.

Scot: On that note I want to leave with an idea that you brought up in your 3rd book that you're talking about basically the idea of a lot of students that have in their mind. That in order to be impressive and in order to have other people think of what they are doing is good and impressive. That they have to do a million and one things and what was interesting is that you studied elite college, like ideally elite college application processes and a lot of students who get into these schools succeeded having not as a schedule where they are doing a dozen things well but it is very difficult to juggle it, and pick a couple of things that they do extremely well and they focus on those. So maybe you could leave on some last thoughts on what you feel are about this Elite of the elite in terms of impressiveness in terms of getting into MIT, Harvard, Stanford, these kind of students and what they have been able to do urgent, be able to have those impressive accomplishments that many others should fight for but at the same time. Life has not been completely overwhelmed by stress and burn out.

Cal: as you mentioned, I read a book on this where I studied this group of students called relax superstars or students that gotten into elite universities still living in low stress and happy high school life. That is exactly what I have found that this idea that somehow doing a lot of things is impressive as basically just a childish notion of impressiveness is sort of the first tabulate we take try to understand what it makes impressive if you knew nothing about it with any sort of reflection, you would say that it is not nearly a sophisticated enough model because if you look a little bit deeper, it is pretty clear that what it is say if you are able to juggle 19 clubs and a really crushing course load that this person is diligent. They can work hard and stay up late and keep a lot of things in the air. The universities are looking for diligent, that is boring. Plenty of people are diligent, universities aren't looking for people that are interesting and going to bring something interesting to the campus, they don't need busy-ness and the same thing goes on the level outside of college or university. No one has hired you to be just diligent, they are hiring you for your capacity to actually be a star of their company to do something interesting so the formula relaxes superstar is quite simple. They did less with a small number of things but they did those things very well. Two things happened when you take the do less but do better philosophy to heart, the first thing that happens is when you focus on something it goes to areas that are interesting and impressive in real deed way. The type of way building impressive admissions officers or a hearing officer for company, the second thing that happens is when you get really good in a small number of things it opens up a lot of these new opportunities to come along just for free so often by the time applying for school, you might have a list of all of these different accomplishments but if you go back and deconstruct them you find out that it is basically a tree where the trunk is something that you focused on intensely and got really got at and then once you are really good at it, a lot of these things came along for free. If you won't get your eye, for example like you can look at my resume, and say "Look he's writing in New York Times, I get to see his speeches across the country and won this award, and say you must be really busy working on these things. That all comes for free if you spend 10 years

like I have focused on writing in a very narrow area. Once you start to get better along with little things along for free those kids get the appearance of extra impressive subject. I think that is the formula that the pre-college age and during college itself "do less but do what you do much better" and if you follow those formulas incredible things to come.

Scott: Well, thank you for joining us this call has been an amazing set of advice. Cal's book is written in force so far, maybe you can correct me if missed quote of the titles "How to Become a Straight A Student", " How to Become a High School Superstar", and " So Good They Can't Ignore You" is his latest book. I've read all of them and they are excellent and I think that they would be an excellent companion if you'd like anything he said in this call, definitely suggest you go out and check them out at any bookstore or any local library.

Cal: Thanks Scott, this was a lot of fun!