Who gets the best grades at top universities? An exploratory analysis of institution-wide interviews with the highest achievers at a top Korean University

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Abstract This study explores what makes high achievement at a top university in order to gain insights into college learning. For this purpose, institution-wide in-depth interviews were conducted with the 45 highest achievers (GPA of 4.0/4.3 or higher) at a top Korean university, and the interview data were primarily analyzed qualitatively to investigate in-depth determinants. The results revealed that these highest achievers share the following specific cognitive, motivational, and self-regulation strategies: (1) they recorded all of the information provided in class; (2) used a motivational regulation strategy rather than motivation itself; and (3) were highly managerial in their cognition, emotions, physical condition, time management, and interpersonal relationships. These findings were verified by quantitative data obtained from online surveys of 1,111 students at the university. Critical implications and suggestions, such as institutional support, evaluation criteria, cultural differences, and other related issues, were discussed.

Keywords High-achieving college students · Cognitive strategy · Motivational regulation · Self-regulation · Higher education · Learning excellence

Introduction

The determinants of academic success in higher education have preoccupied both college students and researchers for decades. Although it may be uncomfortable to admit, it is difficult to deny that receiving good grades is one of the primary concerns of college students, especially in competitive Asian cultures such as Korea. This practical attention is in the same vein as numerous theoretical endeavors discovering varied predictors of high academic performance at college (Robbins et al. 2004).

However, despite the fact that college students have already studied in K-12, many continue to have difficulty in studying and getting high grades in practice. Reports have shown that many college students struggle with writing reports, completing group projects, preparing for presentations, and creating study materials (Garner 1990; Justice and Dornan 2001; Peverly and Brobst 2003; Sol 2007). College students who excel in their SATs (Scholastic Ability Tests) are no exception to this phenomenon, and they experience the similar difficulties as their counterparts in low- or middle-tier universities (Lee and Choi 2010; Robbins et al. 2004). The increasing number of learning centers even in top-tier universities could be seen as evidencing this situation.

Aware of students' difficulties, more and more universities are providing learning centers to support students' learning. Learning centers at Korean universities, for example, have dramatically increased over the last 10 years since these centers became part of the compulsory criteria for college evaluations. Learning centers are trying to reflect related research results on various components affecting high academic performance at college. However, many learning centers mostly provide general study skills or self-management skills with marginal effects and do not

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offer specific detailed strategies that could be helpful in practice (Lee and Choi 2010; Yeom and Jeong 2010).

Studies on academic success in higher education suggest various predictors. Robbins et al.'s (2004) meta-analysis on the predictors of college outcome synthesizes related research undertaken over 10 years and suggests nine constructs.¹ Among the psychological and study skill factors, achievement motivation and academic self-efficacy turned out to be best predictors. A broader approach is McKenzie and Schweitzer's (2001) factor classification. Based on the Australian case, they provided three kinds of predictors: academic predictor, psychosocial predictor, and cognitive appraisal.² A line of studies pursue personal and family background as a main predictor (see Kang 2010; Kim et al. 2001), and some classified the factors into input factors such as students' attributes and process factors such as institutional supports (Shin et al. 2008).

The numerous studies that deal both directly and indirectly with high performance at college cover varied predictors from multiple perspectives. Among those predictors, focusing on major factors that can provide implications for institutional intervention would identify a certain groups of factors. Firstly, studies suggest diverse learning strategies, commonly called study skills, which refer to strategies that facilitate effective and efficient knowledge integration and retrieval to achieve a certain learning goal (Weistein 1987). Those skills range from behavioral strategies, such as test preparation, lecture participation, note-taking, and questioning (Byeon and Kang 2001), to cognitive psychological strategies, such as rehearsal/repetition, summarization (Wittrock and Alessandrini 1990), organization, elaboration (Weinstein and Mayer 1986), and highlighting (Wade and Trathen 1989).

Secondly, studies have reported strong correlations between college students' academic achievement and their self-regulation skills (McCombs and Marzano 1990; Paris and Newman 1990; Pressley and Ghatala 1990). With these skills, students monitor and control their cognition, motivation, and behaviors to attain self-established goals and efficiently plan or allocate time and energy (Cao and Nietfeld 2007; Zimmerman 1989, 1990). Studies suggest that other competencies related to self-regulation such as attendance (Donathan 2003; Druger 2003; Kim 2005), learning hours (Kim et al. 2001; Tak et al. 2006), preparation (Cao and

Nietfeld 2007), restructuring physical environments (Weistein 1987; Zimmerman and Martines-Pons 1990), seeking academic help (Ames and Lau 1982; Karabenick and Knapp 1991), and seating in lecture halls (Brooks and Rogers 1981; Daly and Suite 1981; Kim 2005; Holliman and Anderson 1986; Woolfolk and Brooks 1983).

Lastly, a further group of studies focuses on psychosocial perspectives, such as academic self-efficacy, regulation of motivation, and satisfaction. Academic self-efficacy is the judgment of one's ability to organize and implement the actions needed to complete assignments. Students who have high academic self-efficacy choose challenging tasks (Bandura and Schunk 1991), put more effort into successfully fulfilling tasks (Schunk 1983), and persist at tasks despite difficulties (Bandura and Schunk 1991). A recent approach to student motivation focuses on the regulation of motivation (Wolters 2003, 2010; Wolters et al. 2005). In contrast to motivation itself, motivation regulation is "a deliberate or purposeful attempt to influence students' level of motivation or the processes that determine their motivation", as well as specific strategies such as the regulation of value, self-consequating, environmental strategies, and interest enhancement (Wolters 2003, p. 200). Studies have also shown that satisfaction has a significant impact on college students' academic achievement (Kim 2005; Kim et al. 2002; Shin et al. 2008).

Despite various studies on the skills and strategies that are generally helpful for college learning, however, there has been little work done on this topic from learners' perspectives qualitatively describing which strategies are specifically critical, and how and why they use a certain strategies. The literature has established numerous theoretical constructs based on a deductive statistic approach from pre-designed surveys rather than in-depth interviews directly with the best graders. Therefore, the present study investigates the characteristic strategies of college high-achievers to find out in-depth determinant strategies. The findings are confirmed with quantitative data from a larger sample. This qualitative inductive approach is intended to complement the superficial accounts given in the existing literature and enrich the understanding of college success. This study also provides multiple implications for college teaching and learning, including institutional support and evaluation criteria.

Method

To explore the differences between high-achievers and other students, both qualitative and quantitative analyses were conducted as the sequential exploratory mixed method. The purpose of this methodology is to use quantitative results to support qualitative findings (Creswell 2009). More specifically, the aim is to test the qualitative

¹ These are as follows: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences.

² In more detail, the academic predictor involves secondary school grades and study skills; the psychosocial predictor involves commitment to the university, academic and social integration, satisfaction with the university, financial situation, and career orientation; and cognitive appraisal involves self-efficacy and attributional style.

findings and determine whether the results can be generalized to different samples (Morgan 1998). In the qualitative phase, we collected and analyzed interview data from the 45 best-performing students. For verification of the qualitative results, we developed a questionnaire based on the qualitative findings and distributed it online. Finally, we synthesized and interpreted the results of both the qualitative and quantitative data.

The interview participants represented the best-performing students at Seoul National University (SNU).³ Their GPAs in the second semester of their sophomore year and the first semester of their junior year were higher than 4.0/4.3. Only 150 students (out of 3,000 student numbers) had these high GPAs, and 45 students out of 150 volunteered to participate in the interview. The reasons for this purposeful sampling were as follows. Firstly, the participants can be considered as exemplary learners and experts on learning in higher education, and secondly, the second semester of the sophomore year and the first semester of the junior year are the periods in which college students stabilize their own learning strategies after considerable trial and error (Shin et al. 2008). The 45 participants comprised 15 male and 30 female students. There were 3 liberal arts majors (7 %), 25 social science majors (56 %), 9 natural science majors (20 %), 3 engineering majors (7 %), and 5 music and art majors (11 %). The students' total mean GPA was 4.01 (SD = 0.13).

Each interview lasted between 2 and 5 h. Semi-structured interview questions were based on the literature review. However, we attempted to allow students to speak freely in an effort to gather deeper *emic* perspectives (Bogdan and Biklen 1982). All of the interviews were videotaped and transcribed. The transcribed data were codified and classified for domain analysis, taxonomic analysis, and compositional analysis (Spreadly 1980). For coding verification, two external reviewers (PhDs in education) reviewed the coding analysis. The inter-coder reliability Cohen's Kappa was 0.89.

Based on the qualitative findings regarding the strategies of high-achieving college students, approximately 150 questions were initially developed on all aspects of the high-achievers' strategies. Thirty-five questions were selected to explain the results of this study; the other questions were related to social relationships, family background, team-project learning experiences, and life philosophy, which were beyond the scope of this research. The questionnaire items were measured on a 5-point Likert scale and verified by seven experts in the area for content validity (see Appendix). For construct validity, an exploratory principal component analysis was conducted on the

33 item (2 items out of 35 items were deleted after an initial reliability and factor analysis) with direct oblimin rotation. The KMO (Kaiser–Meyer–Olkin) measure (KMO = 0.908) and Bartlett's test of sphericity ($\chi^2 = 12,514.48$, $p < .001$) confirmed the adequacy of the sample for factor analysis. Based on the literature review and qualitative data, three to five factors with factor loading higher than 0.3 were explored. One item with 0.293 was retained for a conceptual reason. The final pattern matrix with three components showed that rotated factor loadings ranges 0.293–0.874, and variances explained each factors were 26.62, 8.10, and 6.42 %, and collectively, 41.4 %. The reliability of those factors as a result of Cronbach's alpha analysis were 0.872, 0.804, and 0.791 for cognition-related factors (COG), self-regulation-related factors (REG), and motivation-related factors (MOT), respectively, and overall $\alpha = 0.935$. The factor inter-correlations were between 0.234 and 0.480, which were all significant ($p < .001$). To verify the construct structure, a confirmative factor analysis with maximum likelihood estimation was conducted. Two items with highest loadings for each factor were selected and included in the model (Bentler and Bonett 1980). The path diagram shows significant estimates in every path ($p < .01$) (see Fig. 1), and indexes indicate a good model fit (CFI = 0.995, NFI = 0.992, IFI = 0.995, TLI = 0.988, RMSEA = 0.035).

The surveys were distributed online to all SNU students, and 1,111 students responded. The respondents comprised 533 males (48 %) and 578 females (52 %). Ninety-nine respondents had a GPA "higher than 4.0" (8.9 %); 813 had a GPA "between 3.0 and 4.0" (73.2 %); and 199 had a GPA "lower than 3.0" (17.9 %). Of the respondents, 415 were freshmen (37.4 %), 249 were sophomores (22.4 %), 192 were juniors (17.3 %), and 255 were seniors or higher (23 %). There were 143 liberal arts majors (13 %), 394 social science majors (36 %), 324 natural science majors (29 %), 181 engineering majors (16 %), and 69 music and art majors (6 %).

An analysis of variance (ANOVA) was used to test differences by GPA group for the three factors (COG, REG,

Fig. 1 Confirmatory factor analysis on constructs of the questionnaire

³ Seoul National University is the highest-ranked university in Korea, admitting only the top 0.5 % of students who take the College Scholastic Ability Test.

MOT). A preliminary test of the data was conducted to verify the normality and homogeneity of the variance assumption. Levene's statistics were calculated, and the assumptions for the analysis were met only for the MOT score. The ANOVA was used for MOT, and Brown–Forsythe statistics were calculated to test the equality of means for COG and REG, which are usually preferred over F statistics when the homogeneity of variance assumption is violated (Field 2009). For the post hoc analysis, the Scheffe test for MOT and the Games–Howell test for COG and REG were conducted.

Qualitative research results

The interview results showed that high-achievers at SNU used some specific cognition-related, self-regulation-related, and motivation-related strategies. Among these strategies, the dominant variables and the interesting issues are selected and described below.

Cognition-related strategies: include *context* in note-taking

Write down all of the content that the instructor teaches (39 students, 86.7 %)

Among cognition-related factors mentioned by the best-performing students, a notable part was their note-taking strategy; *write down everything that the teacher says*. Majority (86.7 %) of interviewees reported that they attempted to record all of the lecture content in their notes instead of summarizing only key points, stating that they even included the instructor's jokes and questions raised by other students. When the class proceeded rapidly, they often used a voice recorder not to miss any information.

1. I take notes like I am dictating. I try not to miss any words that the lecturer said. If possible, I write everything the lecturer said and review it later, which helps my comprehension process. If I take notes only on the key points of a lecture, I need to infer what was mentioned in between, which takes more time, and sometimes my guess could be wrong. So even though taking notes is a difficult task, I think it helped me understand better (interviewee #6).
2. It contains the whole lecture so I can think back to the situation without any difficulties. Therefore, if possible, I try to take notes without missing anything that is said. Even the jokes in class are in parentheses (interviewee #1).

Students wanted to transcribe complete lectures because they believed that this method increased their *comprehension*. They mentioned that this strategy enabled them not

only to concentrate and better understand the material, but also to achieve the same level of comprehension in a lecture situation and during subsequent studying. Many research participants pointed to *context* and *flow* as the factors that facilitate this comprehension.

3. Not only what the professor said but also the questions or debates that occurred by all other classmates during the class are recorded. When I look at the notes later on, it helps me to remember the context in which these discussion topics were being raised and what the realistic examples were (interviewee #10).
4. Ordinarily, when taking notes, only the introduction and the conclusion are mentioned. This conclusion is derived by understanding the contents in a classroom situation by nodding and writing down the conclusion of the lecture, thinking that you understand. But when you try to study by yourself, sometimes you have a mental block and cannot remember how the conclusion is derived. So I write everything (interviewee #16).

Add additional context: thought-connecting chain, reference (28 students, 62.2 %)

The best-performing students include external stimuli and context in their notes and insert additional information about the environment. This additional context consists of comprehensible clues that occurred during the class. Some research participants expressed these clues as *thought-connecting chains*.

5. A long time after the class, even the knowledge that you thought you had understood has been forgotten; to prevent this, I write everything down. I write it on the side and like I am talking, for example, "Ah! This is how that is derived." When my friends look at my notes, they say it is very absurd. Through this process, I can understand the flow and context of how I came to comprehend the contents. It is like thought-connecting chains (interviewee #26).

Most of the research participants stated that notes containing the context of the class served as an instructional text and became a foundation for structuring, systemizing, and summarizing the lecture note. Furthermore, additional resources and references can help students attain deeper knowledge. These notes become complete study materials.

6. My note includes the whole lecture as it is, so I have a clear flashback when I review it. By reading notes, I picture the class in my mind, remember the contents again and structure the detailed information again. By doing so, I think I form a type of system (interviewee #1).

In sum, the high-achievers attempt to take note of everything in the class including entire lecture as well as *thought-connecting chains* that are helpful at each point in the comprehension process. Additional materials and references are also used to add detailed context for comprehension. Through these methods, the high-achievers produce comprehensive learning materials. Regarding the comprehensiveness and completeness of these learning materials, one participant said, “I myself can even lecture with these notes next semester” (interviewee #18).

Self-regulation-related factors: do not cram

Among the self-control strategies used by high-achievers, *non-cramming* was notable. Instead of using all of their cognitive-, physical-, and emotional energy in a single moment or area, they distribute their energy evenly and appropriately so that they do not become exhausted by a task.

Cognitive and physical regulation: prepare in advance, complete on time, study consistently whenever time allows (42 students, 93.3 %)

The self-regulation strategy mentioned by all of the high-achievers was to never push themselves past their limits. When these students know that a situation will be demanding, they make sure to distribute their efforts evenly. This behavior is evident when they register their classes and when they plan their study time. They distribute their classes throughout the week and make sure to have enough time between classes to avoid excessive workloads.

7. Individual memory has limitations, so it is difficult to control everything. When piled up with other assignments, it is very hard to achieve control, so I scatter my classes and have some break time in between... I use the time in between to take a rest so I don't take too many classes on 1 day. I usually try to plan to have one class each day (interviewee #13).
8. I tend to schedule my classes loosely. I think I take it slow and consider that I did this much today, so I will do this much tomorrow, instead of being stressed out. Tightly controlling my schedule causes stress because I seem to only focus to one part at a time (interviewee #12).

These students had repetitive schedules with lighter loads, which means that they tended to have set patterns and to perform manageable amounts of work at designated times. The students employed routinizing, regulating, and habitizing, which enabled them to live their daily lives without excessive cognitive or physical stress.

9. To have a regulated life, I always register for a 9:00 am class. When I get home, I relax and, without any

exceptions, go to bed at 11 or 12. I try to keep the habits (interviewee #18).

These tendencies require students to have regular study times, although not necessarily extended periods of time. Most of the research participants said that they used time efficiently; their routines involved using the time between study periods effectively.

10. I try to use my time effectively when I am awake, but my friends stay the whole night to study. Calculating the time, my friends study way more than I do, but their results are not always better than mine. So I sleep well, and when I am awake, I use my time wisely (interviewee #6).

This time-management strategy enables students to prepare for classes and finish their work on time. A common method among the high-achievers is preparing reports in advance, which seems to produce better-quality reports. Having extra time allows these students to receive feedback from the writing center or from other people so that they can review and edit their work to polish up.

11. I always start preparing the report writing way earlier than others do, like several weeks ago. I usually finish my assignment at least 2 weeks before the assignment due date. I think I got the hang of how to write a report. After the first draft done, I revise it again and again until it is satisfactory (interviewee #3).
12. I review what I learned right after every class or every break time between classes. I don't go home unless I review what I have learned in class thoroughly. I make sure that I have it all wrapped up (interviewee #18).

These students' characteristics, which include preparing in advance, completing assignments well ahead of deadlines, and studying whenever time allows, enable them to study consistently without burning out. High-achieving students prefer to study consistently every day to avoid excessive cognitive or physical stress, and they report that maintaining an appropriate pace helps them escape from a slump or depression.

13. I might have had a slump or depression, but I've never really recognized it. Instead of cramming in 1 day, I like to do it consistently. Many accounting people seem to cram all financial work at once, but my personality doesn't really like that cramming (interviewee #21).

Avoid emotional upheavals (29 students, 64.4 %)

Emotional control is an interesting aspect of self-regulation. High-achieving students maintained neutral emotions

and avoided being swayed by emotional upheaval. Most of the high-achievers were involved in extracurricular activities, such as school club meetings, hobbies, and dating. However, their involvement in these activities did not affect their emotional stability; they enjoyed these activities while maintaining some distance. Their principles, priorities, and balance were very important to them.

14. Whenever I date someone, I realize that no one can live my life. I have to make my own life. No one can let others lead their lives. When I first dated this girl, I realized that I depended on her a lot, and it made our relationship worse. So I learned that I have to at least do my share of the work (interviewee #45).
15. Moods change from good to bad, and things happen. At this time, how much you can control yourself and keep a positive mindset seems to be important. Which means, for me, that when I feel bad, I don't want to do work, and when I don't want to do an assignment, the results are usually bad. So I try to keep my feelings positive (interviewee #5).

Instead of adopting an emotional approach and becoming overly involved, the high-achieving students prefer to adopt a managerial approach by determining what tasks need to be performed and managing them consistently.

Motivation-related factors: enjoy instead of endure what you have to do (40 students, 88.9 %)

Regarding the motivation strategies, the high-achievers show positive attitudes toward their work and try to enjoy what they have to do. Most of interviewees said that they liked what they studied and that they enjoyed studying. This finding can be seen as natural intelligent curiosity. However, in-depth interviews revealed that it was not intrinsic motivation but a motivational regulation strategy in which the students tried to like what they were required to do. These students recognize that these positive motivational factors can lead to better outcomes. In other words, instead of enjoying studying instinctively, they try to enjoy it intentionally.

16. If there is no way out, I try to learn ways to enjoy whatever I do. And this seems to be the foundation of positive results. There is nothing better than enjoying it, and even people who work hard aren't better at it than the people who enjoy it. If you can't enjoy it, the stress comes to you. So definitely negative results can occur. In every task, there is a fun element (interviewee #6).
17. In the past when I studied, I always thought that I had to achieve a certain goal. So if I don't get a good grade, it was the end of the world. So I thought that I

had to study. That was my motivation. But now, I am thankful that I get to study in this way by having a positive attitude. Because I think if you study with a positive attitude, you can do more things. Although some people have strong wills, there is a stress limit for all of us, but if the stress is converted into a positive attitude, you can accomplish more (interviewee #8).

When high-achieving students take classes that do not interest them or when their primary fields do not suit their aptitudes, these students attempt to view the situation positively. They believe that the process of attempting to find meaning in their activities can change the situation. Some students even explained this phenomenon as *hypnosis*.

18. If I pay attention in class thoroughly, it can be fun regardless of the content. Of course, some classes can be very boring. However, depending on the level of effort, one can find interest. If not, the tuition is a waste of money. So when I take a class, I believe that I must put my efforts and hypnotize myself by telling myself, it is fun, fun (interviewee #16).

As shown above, the participants reported that they could change their motivation or attitude toward a certain task, lecture, or even major by positive thinking. They can control and regulate their motivation, which, they believe, can lead to better performance.

Verification of qualitative results from quantitative data

The quantitative analysis confirmed that the distinctive strategies of highest achieving students are representative of a broader population. In other words, it tests whether students with GPAs higher than 4.0 have higher COG, REG, and MOT scores than students with GPAs lower than 4.0. Table 1 shows the descriptive statistics of the COG, REG, and MOT scores for the three levels of GPA groups. This information is graphically represented in Fig. 2.

A one-way ANOVA was conducted to test whether the mean scores for COG, REG, and MOT were significantly greater for the higher GPA group. Preliminary analysis of the data involved homogeneity of variance assumptions. The Levene's statistics show that the assumption was met for MOT ($F(2, 1108) = 1.904, p = .149$), whereas the assumptions were not met for COG ($F(2, 1108) = 3.291, p = .038$) and REG ($F(2, 1108) = 5.504, p = .004$). An ANOVA was used to test whether the mean scores of MOT were significantly greater for the higher GPA group. There was a significant difference in MOT scores among the three

Fig. 2 Graphical representation of COG, REG, and MOT scores by three GPA groups

Table 1 COG, REG, and MOT scores of the three GPA groups

		COG		REG		MOT	
		M	SD	M	SD	M	SD
Higher than 4.0	(<i>N</i> = 99)	3.57	.067	3.08	.072	3.84	.062
3.99–3.0	(<i>N</i> = 813)	3.07	.020	2.75	.019	3.61	.020
Lower than 2.99	(<i>N</i> = 199)	2.71	.040	2.40	.043	3.34	.046

groups of learners ($F(2, 1108) = 20.996, p < .05$). For COG and REG, the Brown–Forsythe Robust Test of Equality of Means was used. This test is preferred over the use of *F* statistics when the homogeneity of variance assumption is not satisfied (Field 2009). The result indicates that significant differences in COG ($F(2, 261.328) = 50.048, p < .001$) and REG ($F(2, 261.328) = 41.263, p < .001$) exist among the three groups of students.

For MOT, Scheffe post hoc comparisons indicate that the high-GPA group ($M = 3.84, 95\% \text{ CI } [3.78, 3.90]$) reported significantly higher utilization of motivation-related strategies than the medium-GPA group ($M = 3.61, 95\% \text{ CI } [3.59, 3.63]$) ($p < .05$) or the low-GPA group ($M = 3.34, 95\% \text{ CI } [3.29, 3.39]$) ($p < .001$). For COG and REG, a Games–Howell test was conducted. This test can be used when the homogeneity of variance assumption is violated. The high-GPA group ($M = 3.57, 95\% \text{ CI } [3.50, 3.64]$) reported significantly higher utilization of cognition-related strategies than the medium-GPA group ($M = 3.07, 95\% \text{ CI } [3.05, 3.09]$) ($p < .001$) or the low-GPA group ($M = 2.71, 95\% \text{ CI } [2.67, 2.75]$) ($p < .001$). The high-GPA group ($M = 3.08, 95\% \text{ CI } [3.01, 3.15]$) reported significantly higher utilization of regulation-related strategies than the medium-GPA group ($M = 2.75, 95\% \text{ CI } [2.73, 2.77]$) ($p < .001$) or the low-GPA group ($M = 2.4, 95\% \text{ CI } [2.36, 2.44]$) ($p < .001$).

In agreement with the qualitative research results, the quantitative results also reveal that high-achieving students use more COG, REG, and MOT strategies than low-achieving students do.

Discussion

This study explores the factors leading to highest achievement at a top university in order to gain insights into college teaching and learning. In this section, we discuss those critical findings and implications.

Cognitive strategy: writing all of an instructor’s words

Regarding cognitive strategy, an interesting finding of this study is that high-achievers tend to write *all* of the teacher’s words. This finding is in contrast to the previous literature suggesting that summarizing (Wittrock and Alessandrini 1990), organizing (Weinstein and Mayer 1986), structuring, and highlighting (Wade and Trathen 1989) are effective note-taking skills. High-achievers in this study write everything, including all of the professor’s explanations, examples, cases, and their peers’ questions and answers, discussions, and even jokes. They also include clues and links to remind them of the context of each key word, not only from the class lecture but also from other related reference materials. Both qualitative data and quantitative data support that high-achievers adopt this strategy. This note-taking strategy and resultant high achievement may be explained as follows.

No hasty summarization during the class

High-achievers in this study reported that summarizing during the lecture is basically impossible. According to

Rha and Lee's (2011) study of high-achievers' summarization skills, summarization involves holistic, systematic, structural understanding of a given content. In other words, summarization is possible only when they reach at a holistic comprehension. Based on the holistic understanding, they can identify the structure, hierarchy, significant parts, and at last inferred meanings of the content. Writing all strategy appears to provide the high-achievers with materials for the holistic understanding. Summarizing with keywords on site could increase possibility of miscommunications between a professor and a student and misunderstanding of the lecture. By writing all the information, the high-achievers gain time and materials ready at hand for further deeper comprehension.

'Context' rather than discrete 'text'

Another implication of *writing all of a teacher's words* is that these notes include *context* rather than only discrete *text*. High-achievers said that *writing everything* strategy reminded them of the context of the lecture and improved their comprehension. This idea is also supported by the previous literature, which emphasizes context in learning and suggests that context-free text is insufficient for comprehension (Jonassen 1991). According to research on the importance of *context*, concepts separated from their context result in poor learning and minimal achievement (Brown and Palincsar 1989; Collins et al. 1988; Jonassen 1991). That is, recording *context* rather than discrete *text* can lead to high achievement.

Regulation of motivation rather than motivation itself

Another feature of high-achievers of SNU is that their hard work does not come from an intrinsic interest in the subject. That is, they study hard not because the subject is their favorite but because they are attempting to like what they are required to do and maintain their motivation. They intentionally try to find interest in their activities, using strategies to find the positive aspects. In other words, high-achievers are very good at making endurance enjoyable. This phenomenon can be explained by the *regulation of motivation* rather than by primitive motivation itself.

Motivational regulation strategies, as reported by Wolters (2003, 2010) and Corno (1989, 2001), are purposeful activities meant to initiate and maintain individuals' willingness to begin, continue, and complete a particular activity or goal. The *motivational regulation* process is conceptually distinct from the process that accounts for *motivation* itself, which is primarily based on the purposefulness of students' thoughts and actions (Wolters 2003). Motivation causes a person to choose and begin a behavior, whereas the regulation of motivation is an active control intended to manage and

maintain the initial motivation to completion. To apply motivational regulation strategies, a behavior must be initiated by some minimal primitive motivation. However, primitive motivation is generally difficult to be maintained; thus, motivational regulation is required (Wolters 2003).

Within the context of *motivation* and *motivational regulation*, there are three general categories of students. If students have an original curiosity in a subject, this interest becomes intrinsic motivation and is naturally connected to a *flow* stage. This situation does not require a motivational regulation strategy. The achievement level in this case may be very high, but it does not guarantee straight as in all subjects. If a student is overly immersed in one area, another subject may suffer because the immersive flow from intrinsic motivation is not controllable. This type of student, who is absorbed in one subject and cannot be sufficiently managerial across other subjects, usually fails to obtain a high GPA, although he/she can get a high score in one subject. However, many innovative historical achievements have emerged from this type of immersive flow. Therefore, this case should not be judged as a failure. The second type of student feels the need to perform a task even though he/she does not have an instinctive curiosity or primitive interest in it. This necessity produces extrinsic motivation. The student can maintain this motivation using various active motivational regulation strategies and other regulation tactics, such as cognitive, emotional, physical, and time-management strategies. In this case, motivational regulation strategies are critical for high achievement and provide the basis for other self-regulation strategies. This type of high achiever is especially good at making endurance enjoyable. The third type of student has extrinsic motivation but cannot effectively use motivational regulation strategies and, therefore, cannot maintain their motivation to the end. Learning failure may arise from initial motivation that is too weak to be bolstered through a motivational strategy (Wolters 2010). However, this third type of learning failure usually arises when the initial motivation is not maintained despite sufficient initial extrinsic motivation. Previous research has reported the use of various motivational regulation strategies, such as the regulation of values, the regulation of performance goals, self-consequating, environmental structuring, the regulation of situational interest, and the regulation of mastery goals (Wolters 2003, 2010). In this study, high-achievers seemed to concurrently use diverse motivational regulation strategies rather than one specific strategy.

Highly managerial: maintaining a balance in self-regulation

One of the notable features of high-achievers is that their high achievement does not come from their genius but

from their management of life. In other words, a high GPA is not obtained by exceptionally bright geniuses; it is obtained by highly managerial students who balance all areas carefully, including time and schedule management, physical strength, and emotional regulation, so that there is no leak at anywhere. An interesting finding in the interviews is that most of the high-achievers in this study stated that their cognitive intellectual capability was not a direct causal factor for their high GPA. Indeed, high-achievers in this study said that there were truly brilliant students around them and that they were not as brilliant as those who were truly geniuses. Thus, the high-achieving students had to work harder to achieve more. They rarely crammed for tests or assignments; instead, they were more concerned with maintaining balance in every subject. Excess in one area may lead to loss in another, so these students managed and regulated everything very carefully, including their emotions, schedules, health, and even their interpersonal relationships.

Who gets As? What do professors assess?

The results of high-achievers' *writing everything* strategy and *being highly managerial* also reflect the current education system in the university. These students' high achievement results from recording professor's words without critique rather than from creating something beyond it. Moreover, this learning method shows that the current class format in this university is primarily based on one-way lecturing rather than diverse learning activities that engage students' participation. This reflection poses a question of whether this type of high achievement can be regarded as success in college, and it is desirable for nurturing creative, critical thinking, and globally outstanding leaders in top-tier universities. The way in which these high-achievers earn good grades does not follow the model of *innovative leaders* who demonstrate passion and innovation; rather, they follow the model of *steady managers* who handle everything smoothly but never take risks. This result suggests that the educational mission and curriculum of Korean top-tier universities should be revisited with regard to the capabilities that must be pursued in top universities. Many top research universities declare that their educational mission is to raise creative leaders with outstanding capabilities in certain areas. However, these universities might be giving high grades only to students who perform moderately well at everything rather than to students who show outstanding abilities in one field but relatively poor performances in other fields. Universities are likely to overlook the fact that they make the latter students losers in higher education. From the high-achievers' learning strategies, therefore, we should reflect what university or professors should assess.

Conclusion and suggestions

The purpose of this study was to investigate high-achieving college students' learning strategies at a Korean top-tier university. The findings revealed that these high-achievers showed similar behavior patterns in cognition, motivation, and self-regulation, which were explicitly differentiated from those of lower achievers. The findings have the following practical implications for institutional support.

Firstly, based on the implication of *writing everything* strategy, college learning support should consider video-recording all classes so that every student can access lectures at any time. Some universities (i.e., the Graduate School of Education at Harvard University) provide recorded lectures with captioning so that both disabled and non-disabled students can review the class lectures at any time. Providing recorded lecture all the time actually would not facilitate *writing all strategy*; instead, it helps high-achievers as well as low achievers not to be too busy for taking notes during the classes, but to more concentrate on class activities or discussions. However, we still believe "writing all strategy" should not be ignored. In receptive learning, especially, writing all down would make students keep concentrating on the lecture to acquire knowledge more effectively. It also helps students organize and structuralize the learning content. Therefore, writing all strategy can be considered as a helpful strategy for lower achieving students, especially in receptive learning.

Secondly, designing a learning environment, such as LMS (learning management system), to support managerial strategies would be useful for students with self-managing difficulties. Motivational regulation strategies represent valuable advice, especially for students who want to know how to maintain their initial motivation until their desired end. In addition, future qualitative and quantitative research should focus on the relational structures among the strategies in this study.

Thirdly, considering only GPA as an indicator of high achievement is a limitation of this study. Certainly, GPA does not guarantee life success. There are many great people in human history with outstanding constructive achievements, such as innovative inventions or historical discoveries, who were excessively immersed in one field and performed poorly in other areas. Thus, the scope of this study is limited to strategies for achieving high GPAs. This work is not a prescriptive study stating that every student should simply follow the strategies outlined. Rather, this is a descriptive study that highlights the sources of high achievement in a top-tier university. Accordingly, this study asks universities to review and reflect on their educational goals (why they teach), curriculum (what to teach), and instructional methods (how to teach). The high-achieving strategies found in this study follow the 'strategic' approach found in the Biggs framework (Biggs 1989, 1992; Zhang

2000), which is perceived as the most desirable learning approach in the previous literature. However, this study evokes the question of whether this ‘strategic’ approach is the most desirable for every type of achievement. In this context, research topics such as *what universities teach and evaluate* could be an interesting theme to draw attention from universities’ policies and strategies.

Finally, the results in this study should not be generalized to other contexts before further verification. As the title stands, this study is by nature exploratory. The results of this study may be unique to SNU. The features of highest achieving learners in this study may, or may not represent Korean or similar Asian cultural contexts. However, the tendencies identified in this study may be found in other Asian countries with Confucian heritage cultures (CHC). A line of research on CHC has commonly reported that learners in CHC are familiar with passive mastery learning (Biggs 1989; Kember 2000; Smith and Smith 1999). Therefore, an analysis of how the behavior of top students in highly selective Korean University could contribute to an understanding of the high achievement factors in CHC countries. A comparative study that explores the learning strategies of high-achieving students in different cultures would be an interesting topic for further research.

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Appendix

Questionnaire items	Strongly agree			Strongly disagree	
	5	4	3	2	1
<i>Cognition-related items</i>					
1. I stay highly focused, even during boring classes	☐	☐	☐	☐	☐
2. I never doze during class	☐	☐	☐	☐	☐
3. I try to have a front-row seat	☐	☐	☐	☐	☐
4. I try to understand 100 % of the content during class	☐	☐	☐	☐	☐
5. I try to write down everything the professor says	☐	☐	☐	☐	☐
6. I consult other references in addition to the main textbook	☐	☐	☐	☐	☐
7. I look up references if there is anything I cannot understand	☐	☐	☐	☐	☐
8. I study only with my own notes, not anybody else’s notes	☐	☐	☐	☐	☐

Appendix continued

Questionnaire items	Strongly agree			Strongly disagree	
	5	4	3	2	1
9. I usually keep my notes focused on test preparation	☐	☐	☐	☐	☐
<i>Self-regulation-related items</i>					
10. I manage my time very strictly	☐	☐	☐	☐	☐
11. I even plan my play time	☐	☐	☐	☐	☐
12. My life follows my preplanned schedule	☐	☐	☐	☐	☐
13. I try to finish the work I am supposed to finish on a given day	☐	☐	☐	☐	☐
14. I invest a regular time in studying every day	☐	☐	☐	☐	☐
15. I use a scheduler to manage my time	☐	☐	☐	☐	☐
16. I try to avoid meeting with my friends when I have things to do	☐	☐	☐	☐	☐
17. I always plan when I study	☐	☐	☐	☐	☐
18. I usually cram when I study for tests (Reverse)	☐	☐	☐	☐	☐
19. I read the main textbook only when I study for tests (Reverse)	☐	☐	☐	☐	☐
20. I don’t cram but study regularly to get a good grade	☐	☐	☐	☐	☐
21. I eat regularly	☐	☐	☐	☐	☐
22. I sleep regularly	☐	☐	☐	☐	☐
23. I exercise regularly	☐	☐	☐	☐	☐
24. I plan and prepare reports beginning on the day it is assigned	☐	☐	☐	☐	☐
25. I finish my assignments long before the due date	☐	☐	☐	☐	☐
26. I revise my writing many times before submitting	☐	☐	☐	☐	☐
<i>Motivation-related items</i>					
27. Learning at college is enjoyable	☐	☐	☐	☐	☐
28. I feel I am growing each day through my college education	☐	☐	☐	☐	☐
29. I am sure that my efforts will be rewarded	☐	☐	☐	☐	☐
30. Difficult times lead to growth	☐	☐	☐	☐	☐
31. I make an effort to become/remain happy	☐	☐	☐	☐	☐
32. I am satisfied with my college life	☐	☐	☐	☐	☐
33. I am happy now	☐	☐	☐	☐	☐

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