Cheating and other student strategies:

A system dynamics policy analysis for students that want to graduate

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Abstract

This paper explores different strategies students can utilize in order to graduate. A good grade is considered of great value and something some students are willing to utilize extreme means to achieve. Traditional means of hard work and dedication can help a student to graduate, but for some, alternative measures must also be taken. One possible strategy a student can choose to implement in order to advance his academic carrier is cheating.

The system dynamics model constructed for this project is a combination of Carroll's model on school learning (1989), Merton's theory on deviant behavior (1968) and Barlas's and Yasarcan's (2005) SD model on implicit goal structures. The model offers insights on feedback processes available to students and how the students' grade can be affected by cheating.

Key words: Cheating, system dynamics, student policies, graduation, feedback, Carroll's model on school learning, Merton.

Acknowledgements

I dedicate this paper to my Sara, without whom none of this would have been possible and nothing would make sense.

This paper took some time in the making. Over the course of more than a year, different topics, from the State church in Norway to corrupt dictators in Africa have been discussed and dismissed. Finally, *students cheating strategies* presented an option for me to settle on a topic and finally graduate.

I want to thank my friends, Cynthia and Johannes, for helping me through this process and my family for enduring all my moods.

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The very fact that you have lawsuits among you means you have been completely defeated already. Why not rather be wronged? Why not rather be *cheated*? Instead, you yourselves *cheat* and do wrong, and you do this to your brothers and sisters.
1 Cor: 6

1 Introduction

When dealing with students, some are better than others.[1] For some, learning is easy and graduation comes naturally. Others however, have hard time learning and many problems regarding graduation. This paper looks into different strategies a student can utilize in his studies in order to graduate based upon both social- and psychological literature.

Throughout this paper, two basic assumptions should be kept in mind:

1. All students want to graduate.

Higher education can be regarded as an investment for the individuals future where trade-offs and opportunity costs[2] can have considerable value. The US college system is a part of the county´s higher education system so most students go there of their own free will with the hope of something better. Students have to apply to enroll, and if the student meets certain criteria, he is accepted into the system by school authorities (U.S. Department of Commerce, 2009).

2. Every semester, a student can achieve something academically by *traditional means of hard work and dedication*.

The students' *academic achievement* then has a determining effect on how the student will be evaluated within the system. *Ceteris paribus*, the students' academic achievement will indicate the students' grade.

But graduation from the US college system is not given; it requires hard work and dedication on behalf of the student (Carey, 2004). He must be willing to devote time and effort in his studies in order to achieve what he wants academically. Plus, there are other means available to get the results required.

One possible strategy a student can choose to implement is cheating. Then the students' grade is not only the product of the students' traditional means of hard work and dedication, but also by *alternative means of cheating*. Feedback processes that can affect the student's grade will be identified later in the paper and put in the proper context of the student body.

The method applied in this paper is *system dynamics* (SD). SD offers a methodology where structural relationships between variables are formulated and analyzed accordingly. With a system dynamics model it is possible to draw up a more holistic view of the system and

[1] In this paper, a *student*, or *model student*, will be referred to as masculine, even though they are both women.
[2] The *opertunity cost* counting the second best thing you could do with your time.

investigate complex social phenomena to deepen the understanding of certain relationships (Forrester, 1973).

The setup of the paper follows a numerical sequence. After the introduction, the second chapter will introduce problems facing students regarding graduation and possible solutions for those problems. The problems will be viewed from different points of view and the theoretical foundation for the paper will be set. The third chapter holds the hypothesis. There, questions regarding student graduation will be put forth to be tested with a dynamic model. The forth chapter is the description of the model structure. All the variables in the structure are listed and their part in the dynamic model explained. In chapter five the policy structure for the model student will be explained in the same manner as the basic model structure. The following subchapters will present the model in the form of a causal loop diagram where different student policies will be identified. The model will be analyzed in the sixth chapter and after the analysis, some concluding remarks on cheating in college. Chapter 8 lists the references and finally appendix 1 holds the model unit and documentation and appendix 2 the simulation results.

2 Literature review

2.1 The problem

The students' grade is one of the determining factors when it comes to education. If a student does not reach a certain minimum grade standard, he will fail the semester. But if the students' goal is to graduate, how can he achieve that goal?

A student must solve many problems before graduating. A degree from a prestigious college can offer multiple opportunities for the right student, making way for a better life. But time is of the essence; for a promising young student every semester delayed in college is counted as lost somewhere else. Therefore a student facing problems regarding graduation must either change his behavior or run the risk of failing the semester (Swanson, 2004).

Many options are available to students at all levels to get a better grade. Some of these options offer traditional means of motivation and dedication to prevent a student from failing. Others offer alternative means, such as cheating, to save the students grade and pave his way to graduation day.

2.2 Cheating

For a student that cheats, cheating isn't a problem, it's the solution. Even though it is not publicly accepted, many students have indeed decided to take a short cut in the race towards graduation and cheat (Bowers, 1964). But there are those that oppose cheating and consider that to be a problem in itself.

"*Cheating is a serious problem in many countries. The cheater is a free rider and therefore gets higher marks than he or she deserves. The efficiency of the country's educational system is reduced, because cheating distorts competition, diminishes the student's incentive to study, and leads to inaccurate evaluation of the student's abilities*." (Magnus et al., 2002)

2.2.1 Definition of cheating

Academic cheating involves fraudulent means to achieve higher grade (Michaels and Mirht, 1989). Rather than being the norm, can cheating within academic institutions be defined as a specific type of deviant behavior (Mixon, 1996). It gives an unfair advantage to the person cheating and distorts the conventional evaluation of learning processes.

But what exactly can be considered as academic cheating? According to MIT's handbook on academic integrity there are clear indications about how a student should NOT behave when pursuing an academic carrier (Brennecke, 2010):

- *Cheating* is when a student uses unauthorized material in an exam, copies answers from another student or submits the same paper in more than one class.
- *Plagiarism* refers to copying someone else's work and posing it as your own. This happens when a student does not adequately cite sources and references.
- *Unauthorized collaboration* is when students work together on projects that are supposed to be individual projects.
- Finally, *facilitating academic dishonesty* refers to when a student assists another student on a project that is supposed to be done individually.

2.2.2 Who cheats and why

Why students cheat has been a matter for debate within the psychological literature for a long time. Two basic emphases prevail in this investigation; one is individualistic, the other is contextual.

The individualistic view looks at demographic variables or inherent individual characteristics such as age, sex, marital status or class when trying to determine tendencies toward cheating (Aiken, 1991, Barnes, 1975, Gardner et al., 1988).

Many studies have focused on the relationship between cheating and individual academic achievement (Bunn et al., 1992, Haines et al., 1986, Singhal, 1982). All indicates that students with lower grades (grade point average or GPA) have a higher propensity to cheat. However, McCabe et al. (1997) suggested that students with high GPA may also have a tendency to cheat depending on the relevance of the course.

Contextually there have been recorded a number of situational factors that influence cheating behavior (Crown and Spiller, 1998). The significance of observing others cheat (Bunn et al., 1992), being in regular contact with someone that cheats (Michaels and Miethe, 1978) or students perception of cheating (Ward and Tittle, 1993) have all been shown to have a significant effect on cheating.

Other social characteristics that have been shown to correlate with cheating include students that belong to some sub culture of the mainstream collage culture like sorority girls, fraternity boys or varsity athletes (Baird, 1980, Haines et al., 1986).

The morale climate within an institution can have profound effect on cheating (Bushway and Nash, 1977). According to their study, a student may be more inclined to cheat if the relationship between morality and cheating is not clear.

Malinowsky and Smith, (1992) found a clear correlation between a student's morale reasoning and attitude towards cheating. Students with low moral judgment cheat more. Whereas students with higher moral standards cheat less but will also cheat if the perceived benefits from engaging in cheating increase.

2.2.3 Caught cheating

Apparently there seems to be little correlation between the severity of the punishment if caught cheating and frequency of cheating. The perceived punishment can be minor, like only having to retake the course, or it can be more severe where the student may fail the course or even be expelled from the institution. No matter how severe the punishment is, it will not play a major role when a student engages in cheating because the student does not expect to get caught. The student already knows that he is not supposed to cheat, but does it anyway (Fisher, 1970, Bunn et al., 1992). In extreme cases like in the ancient Chinese civil servant test, students were forced to write the exam confined in a cubical after being searched for illegal

material. If a student was caught cheating, both the student and the person responsible for monitoring the student, were killed. Still people cheated (Brickman, 1961).

2.2.4 Statistics on cheating

Students can start cheating at an early age. Schab (1969) reported 24% of girls and 20% of boys cheating in the first grade in the US school system. Different studies have reported between 13% and 95% of all students admitting cheating at least once over the course of their academic carrier (Hains et al, 1986, Tittle and Rowe, 1973).[3]

As the institutions adapt to a growing number of cheats, students get more innovative and figure out new ways to cheat. Although no official numbers are available about the actual number of students caught cheating every year, studies indicate that this number is probably somewhere between 2% - 12% (Shon, 2006).

Cheating can also be seen as part of a student's strategy in order to improve his or hers grades. In 2001 Whitley and Keith-Spiegel discovered that 87% of males and 54% of women believed that cheating could help them in an exam. Even though their study indicated that cheating did not contribute much to better grades, it explained in part why students cheat; they think it helps.

2.2.5 Cheating as a crime

The criminal aspect of academic cheating has been stressed in the past. Magnus et al. (2002) drew comparisons between cheating and corruption in a cross national study where they suggest a *Tolerance-to-Cheating Index*, similar to the *Corruption Perception Index* published annually by *Transparency International (TI)*[4]. Also, Bunn et al. (1986) pointed out the similarities of academic cheating and the act of theft.

But if cheating can be viewed as a type of criminal behavior, what drives the criminal? Becker (1968) proposed that a criminal can be seen as a reasonable man. Every act carries with it a certain amount of costs and benefits that the individual weighs accordingly. The costs for the actor can include things like the perceived punishment, the risk of social exclusion or the probability of getting caught. All things being equal, increasing costs would decrease the frequency of the behavior in question and vice versa. The benefits would include all the gain

[3] No study reviewed for this paper ever recorded no cheating.
[4] For furhter details on TI visit http://www.transparency.org/

for the actor in quantitative terms. This could include benefits like money, or in the case of cheating students, higher grades.

2.2.6 Cheating and goal orientation

Research has shown that students are mainly driven by one of two basic types of goals; *Mastery goals* or *performance goals* (Anderman and Midgley, 2004). A mastery goal orientation means that a student is motivated to learn for the sake of education, where as a performance goal orientation implies that the education is only a means to an end (the end being good grades for example). Most evidence suggests that students highly motivated towards performance goals are more inclined to cheat (Newstead et al., 1996, Whitley, 1996). It has also been suggested that up to 85% of all college students in the US only consider their education as a means to an end and that they are only willing to spend a minimum amount of time to achieving their goal (McCabe, 1996).

2.2.7 Cheating after college

The consequences of cheating are indirect; sublet yet serious. With more attention being paid every year to cheating in business, industry and government, the impact of this development can be observed in the growing numbers of reported cases of embezzlement, misappropriation of funds and insider trading (Michaels and Mirth, 1989). Correlations between cheating in collage and unethical business proceedings have also been confirmed by Davy et al. (2009).

2.3 System dynamics and cheating

The founding father of system dynamics, Jay Forrester, points out in his 1973 paper, *Confidence in models of social behavior*, that system dynamics can offer an alternative view for analyzing complex social systems. SD can incorporate many different aspects of reality into one model. By simulating the model over time it is possible to recreate historical behavior and then analyze the effects of different policies on the system.

So far the system dynamics methodology has never been applied in the investigation of cheating. Sterman (2000) has in his book *Business Dynamics* a reference to a model where workload and time management determine a student's grade. However, in his case the student does not cheat in order to graduate, but rather creates a new loop and get a time extension.

System dynamics can offer some literature on problems regarding goals and goal settings. Barlas and Yasarcan (2005) published a paper where they demonstrated how an implicit goal operating within a system can determine the eventual outcome despite all stated goals.
Finally worth mentioning is the work of Jacbsen and Law-Yone (1983). They applied SD to sociology when modeling normative ambiguity. They suggested that SD could be applied to testing alternative theories of the social sciences, like Merton's theory on social deviance for example.

2.4 Merton's theory on social deviance

Robert Merton was a sociologist from the US. He is probably best known for coining *the self-fulfilling prophesy,* in his 1968 book *System Structure*. In that book Merton theorizes the causes and consequences of deviant behavior within social systems. Merton looked at deviant behavior in relation to two other variables in particular: *Culturally defined goals* and *means to achieve those goals*.
He took *the American dream*, of being rich and successful, as an example of a culturally defined goal. Traditional means expect you to work hard, pay your taxes and eventually all your hard work will pay off.
However, in a society that includes hundreds of millions of people, individuals will from birth not possess the same means to achieve their part in the *American dream*. On one hand some people are born gifted, others wealthy. On the other hand, those born less fortunate will innately not possess the same means to get their part in the *American dream* as the gifted or lucky. So instead of going to college and working for a *fortune 500 company*, a person may decide to deviate from the norm and earn a fortune by alternative means.
This view can be transferred to cheating in college. Then, the culturally defined goal is the grade. A good grade is assumed to project you better into the future than a bad grade and therefore students place much emphasis on getting a good grade. The goal of getting a good grade is so strong that some students will cheat in order to achieve it.
However, not all students possess the same means to get a good grade. On one hand, some students are gifted, others diligent. On the other hand, personal limitations and lack of effort can force a student to seek alternative means in order to get a good grade.
According to Merton's theory, the specific type of deviant behavior that occurs when the culturally defined goal is accepted and the traditional means to reach the goal are rejected is classified as *innovation*. And what do cheats have to be if not innovative.

2.5 Carroll's model on school learning

In 1964, John B. Carroll published a small model aiming to show how students learn in school. In his model, a student's *academic achievement* is the product of time. By dividing the time the student is *willing* to spend on his studies with the time he actually *needs* to spend on his studies, the student's *school learning* can be calculated. The students' school learning will then determine his *academic achievement*.

2.5.1 Aptitude

One key variable in Carroll´s model is the student's aptitude. The aptitude determines:

"…the amount of time a student needs to learn a given task, unit of instruction, or curriculum up to an acceptable citation of mastery under optimal conditions of instruction and student motivation" (Carroll, 1989).

A student with high aptitude will need less time to learn than a student with lower aptitude.
The Carroll model offers some basic equation on how students can achieve something academically over the course of their academic carriers. The equations from Carroll´s model are incorporated into the model for this paper and can be seen in chapter 4.2.2.

2.6 Summary

This chapter has pointed out different social- and psychological factors for a holistic picture of different student graduation strategies.

The act of cheating works on many levels. On the individual level the student can decide on his own strategy in order to graduate. He can cheat or not, depending on the circumstances. Some individual character types, like students with low grades for example, have been shown to be more prone towards cheating than others. Individual motivations differ and for those willing to deviate from the norm, cheating is a real option.

On a more social level there is the students' graduation. The value placed on the students' grade by society is so great that some people are even willing to deviate from the norm in order to reach that goal.

The model in chapter 4 incorporates both these perspectives. Different individual character types provide input for testing the model. Model students will then use whatever means at their disposal in order to graduate.

On the social level, the model displays the basic structure available to all students facing graduation. By no means does the model present all options available to students that want to graduate, but it does offer some alternative scenarios where students can graduate by utilizing different means at their disposal. Even though not all students initially start out on equal terms, by focusing on specific parts of the structure, any student can graduate with honors. However, the deviant behavior is just as much a part of the social structure as the normal behavior (Merton, 1968), so even though a student does not cheat, the option is always there.

3 Dynamic hypothesis

Based on the two basic assumptions from chapter 1, *all students want to graduate* and that *every semester, a student can achieve something academically by traditional means of hard work and dedication*, the following questions are put forth:

What can a student do in order to graduate?

What strategies can a student use to his advantage to gain the most from his academic pursuit?

To investigate this matter further, the following hypotheses were formulated for testing purposes:

H0: All students can graduate.

H1: Students with low aptitude are more likely to cheat in order to graduate.

H2: Students with low aptitude can graduate without cheating.

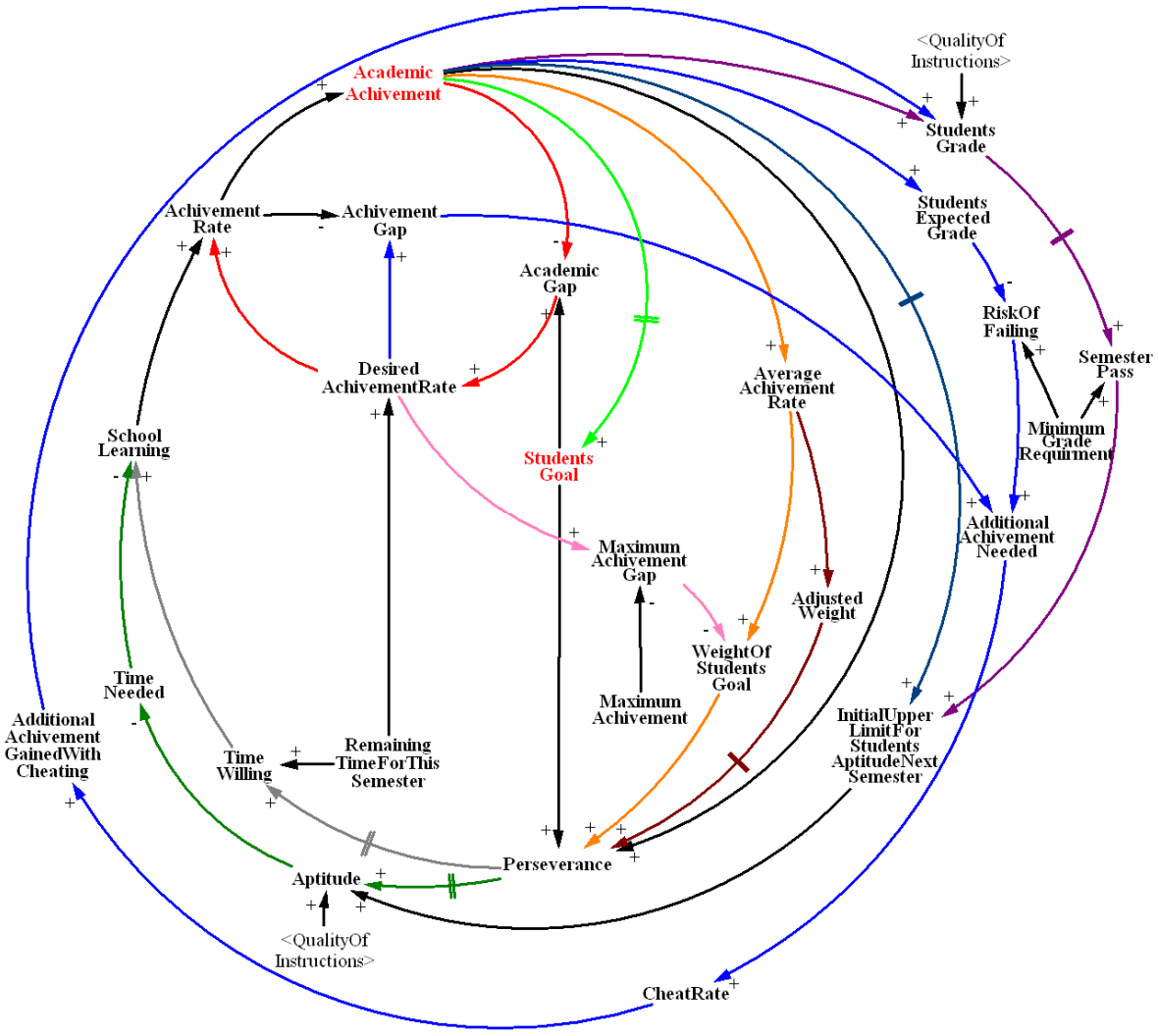

Figure 1 shows how the model student can graduate by building up academic achievement. The students' goal is at the core of the structure.

3.1 Reference mode

When dealing with deviant behavior like cheating, many problems can emerge. From a researcher's point of view, good reliable data can be hard to come by because of the secrecy and shame involved. As a result, there is no historical reference mode behavior that can validate the model. However, there are reference points available that indicate the level of cheating within the college system in the US at specific point in time.

Total number of self-reported cheating among US college students from 1963 – 2005[5]				
Year	**1963**	**1990**	**1995**	**2005**
N (students)	3711	5963	4158	3441
Total (%)	75	65,4	70,2	57,2
No code (%)	83	77,5	81,9	68,3
Code (%)	63	53,2	60,3	49,8

Table 1: The Year square in table 1 represent what year the data was collected. N is the total number of students included in the sample. The Total (%) represents the percentage of the total sample admitting one or more act of serious cheating over the course of their collage carrier. No code (%) and Code (%) represent the same value as the Total (%), only aggregated further in accordance whether or not the institution had in place an honor code system.

The latest figures indicate that in 2005 on average, 57.2% of college students in the US cheated once or more over the course of their academic carrier. This in itself verifies the existence of cheating within the US college system and indicates the frequency at which it is happening.

[5] The data was collected from a nationwide sample, first by Bowers (1964) and then by McCabe et al. (1996, 1997, 2004).

4 Model structure

The following chapter will discuss and explain the system dynamics model used for this project. The structure of this model is generic in the sense that it applies to students in general. However, for this project, students in US colleges were of special interest.

This is an individual model where different characteristics of students will determine their behavior within the system.

The model structure is basically an individual ageing chain consisting of eight consecutive semesters. Each semester applies to one student and has a duration time of four months.

The structure of the model is innately a goal seeking structure consisting of stocks, flows, constants and auxiliary variables (the goal being the grade). The same basic structure applies to all semesters with a few exceptions. The first and last semesters are a bit different from the rest so initially there is a detailed description of the first semester, then the second and finally the last semester. The basic structure applying to all students will be described first, then the individual policy structure that students can choose from during their academic carrier.

To distinguish between semesters each variable was named with the appropriate ending; 1 for the first semester, 2 for second semester etc. Variables that have no numerical ending, like the *MaximumAchievementRate* for example, are constant and apply equally in all semesters.

4.1 Color scheme and variable shapes in the model structure

The basic structure of the model is black. All the *constants* are diamond shaped and most of them are filled with a yellow color. All other colors on constants (orange, pink, etc.) indicate where different student policies connect to the structure.

The *variables* have a round shape. The variables with red and blue outlines are the same. If a variable has red color it means that the variable is used as a shadow variable somewhere else in the model. The blue variables are the shadow variables, calculated elsewhere in the model but for practical and ascetical reasons, duplicated.

The *MaximumAchievementRate* can again offer an example. In the first semester the variable is yellow and red. That means the *MaximumAchievementRate* is a constant that is used elsewhere in the model. In the second semester the *MaximumAchievementRate* is yellow and blue, because it is a shadow variable for the first semester and allies equally in all semesters.

Graphical functions are round and marked with green outlines. There are three variables of this nature each semester. The graphs themselves remain the same but the input variables differ from semester to semester. The graphical functions will be explained in more detail in chapter 4.2.1.

There are four main *stocks* each semester. They have a square shape and serve the purpose of accumulating or depleting certain things over the course of the simulation. The arrows into the stocks represent the *flows* that can change the value of the stocks.

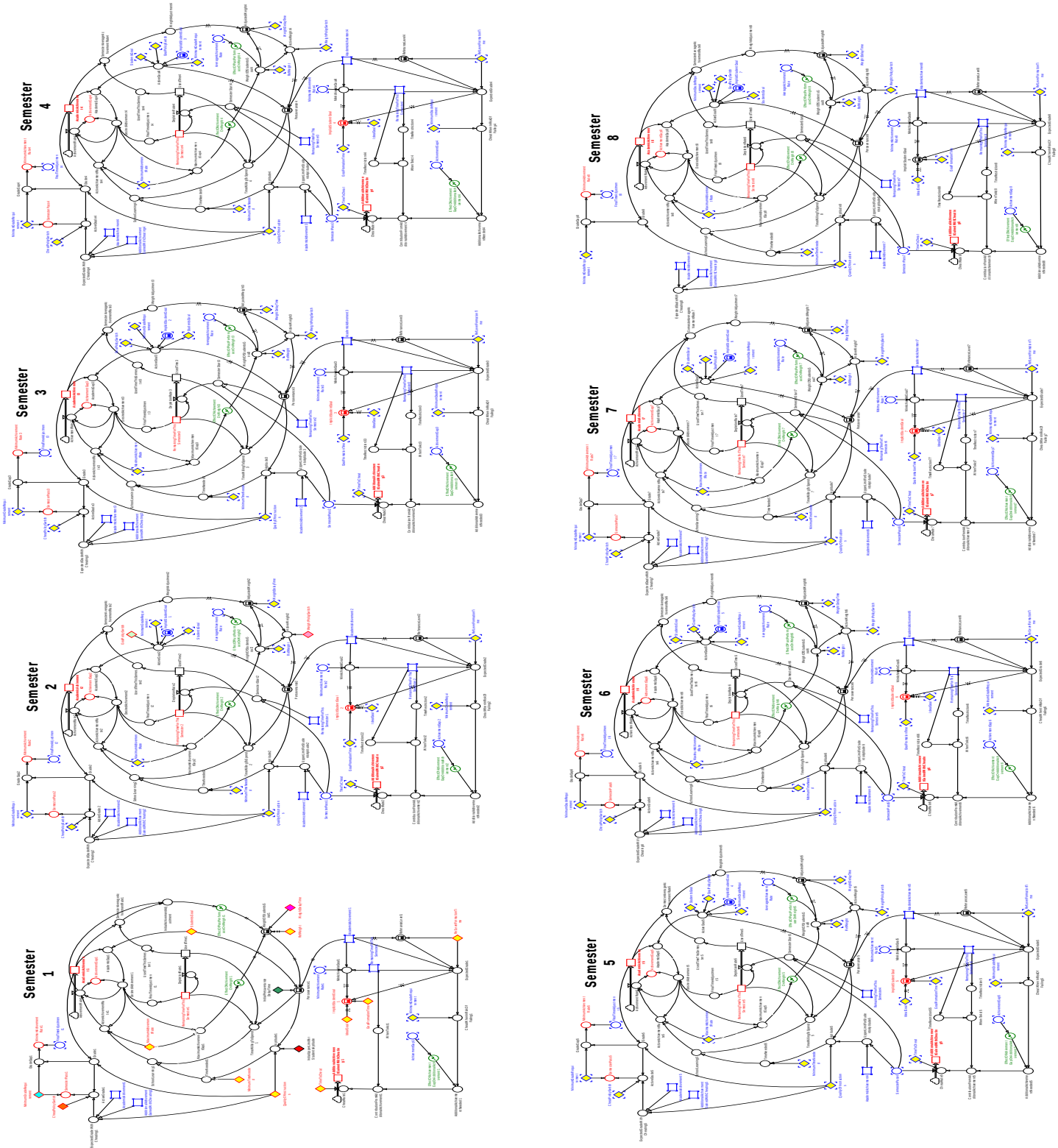

Figure 2 shows the total structure for all the semesters. The only model structure not visible in this diagram is the average structure in chapter 4.6.

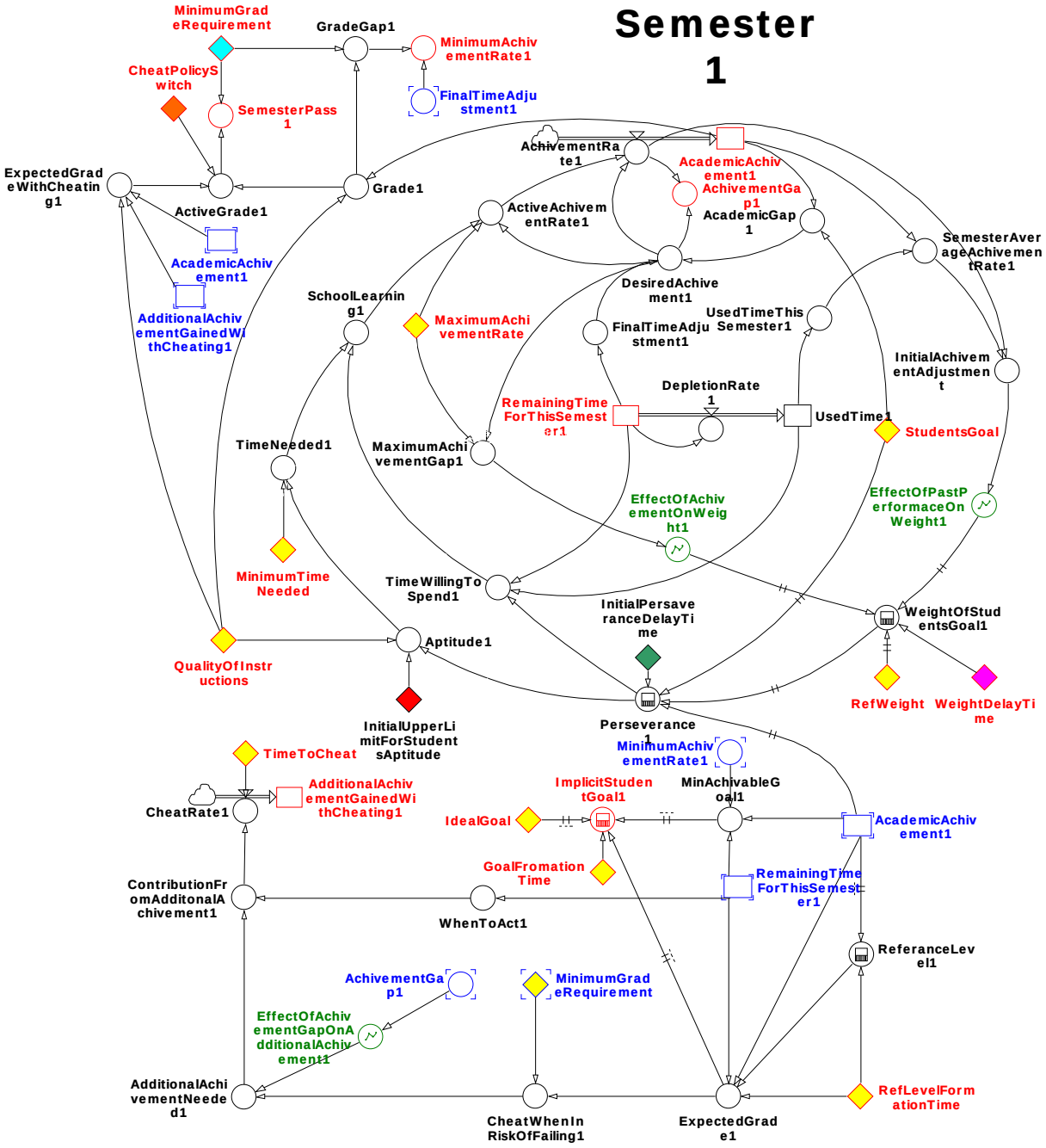

Figure 3 shows the individual structure for the first semester.

4.2 The basic structure

Not all parts of the previous structure in *figure 3* will be operating at the same time depending on the model student's strategy. *Figure 4* shows the basic structure for the first semester that applies to all students no matter what.

4.2.1 Basic structure for semester one

For every student there is a limited amount of time each semesters has to offer; four months. After four months the model students' academic achievement will determine the model students' grade.

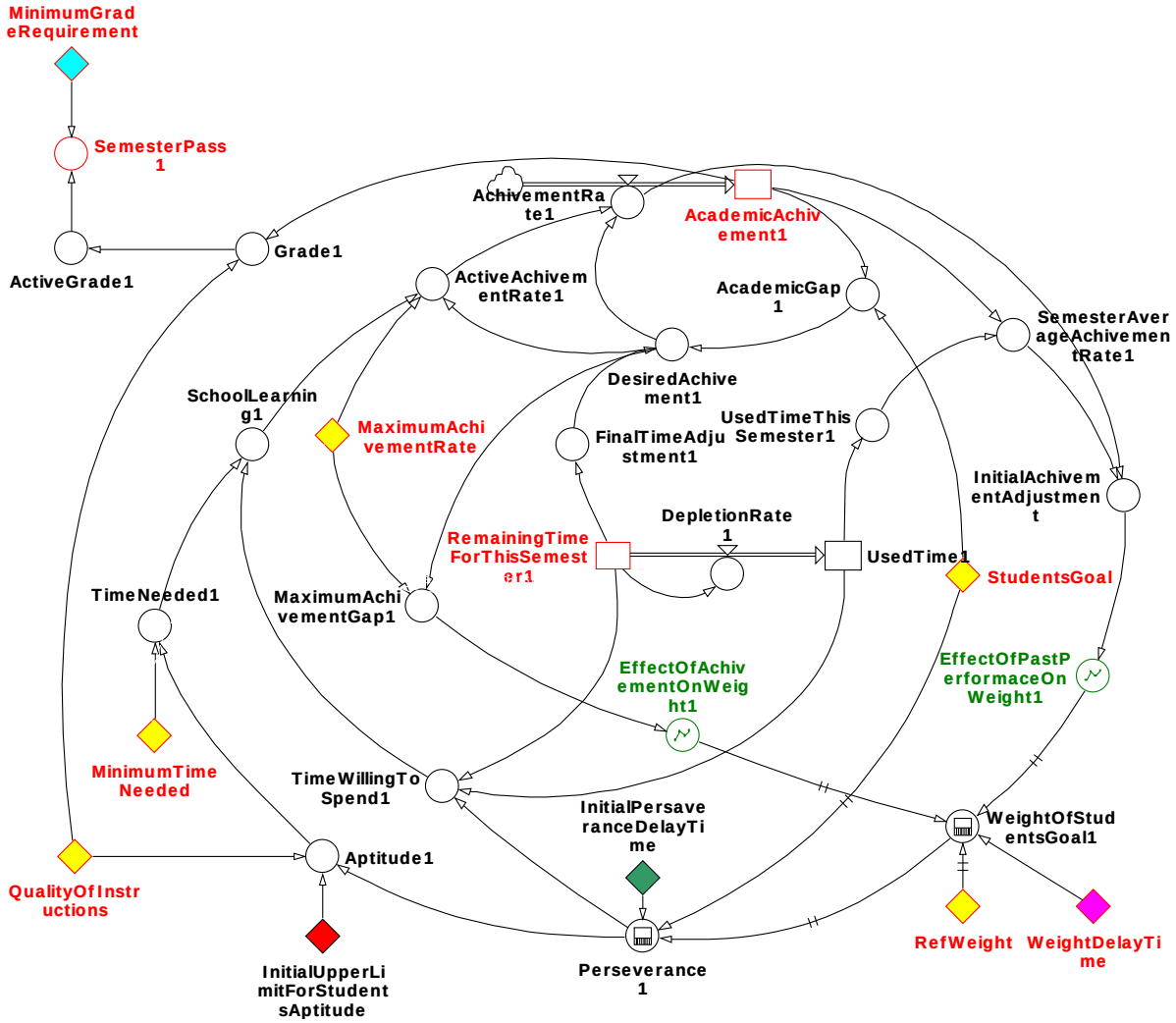

Figure 4 shows the basic structure for the first semester that applies to all students, regardless.

The first stock of interest is *AcademicAchievement1*. Initially the student's academic achievement is zero. The student has achieved nothing within the time frame of the simulation. Given the assumption that the model student has high ambitions and strives for maximum achievement, the student will have a *StudentsGoal* of 1. That means initially there is a gap between what the student wants to achieve and what he has already achieved; the *AchievementGap1*. To prevent this gap from becoming negative an *if function* was used:

AchievementGap1=IF(StudentsGoal-AcademicAchivement1<=0,0,StudentsGoal-AcademicAchivement1)

The *AchievementGap1* feeds into the *DesiredAchievementRate1* along with the *FinalTimeAdjutment1*. The *DesiredAchievementRate1* indicates how much the student should be achieving given the size of the *AcademicGap1* and the *RemainingTimeForThisSemester1*:

DesiredAchievementRate1 = AcademicGap1/FinalTimeAdjustment1

Because time will eventually run out for the student, the *FinalTimeAdjutment1* had to be included to prevent the *DesiredAchievemntRate1* from being divided by zero. That is a simple if function. In all other retrospect the *FinalTimeAdjutment1* equals the *RemainingTimeForThisSemester1*:

FinalTimeAdjutment1=IF(RemainingTimeForThisSemester1<=0<<month>>,1<<month>>, RemainingTimeForThisSemester1)

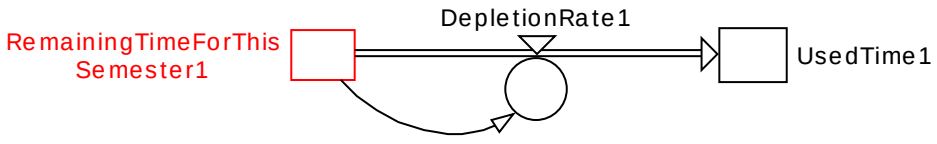

Figure 5 shows the basic time structure for the first semester.

Initially the *RemainingTimeForThisSemester1* is four months. The *DepletionRate1* is set equal to one month per month, and the *UsedTime1* is zero months. Because of the stock and flow nature of this time structure it is possible to simulate each semester and take into account that each time step the student has a little less time to achieve his goal.

As a function of the *TimeRemainingForThisSemester1*, the *DesiredAchievementRate1* finally feeds back to the *AchievementRate1*, closing the first basic goal seeking loop for the *AcademicAchievement1*.

The *AchievementRate1* indicates how much the student manages to achieve each month through traditional means of hard work and dedication (Merton, 1968). The equation for *AchievementRate1* is:

AchievementRate1 = Min(ActiveAchievementRate1, DesiredAchievementRate1).

The *ActiveAchievementRate1* determines the actual achievement of the student:

*ActiveAchievementRate1=Min(DesiredAchievementRate1*SchoolLearning1,MaximumAchievementRate)*

The same limitations apply to the model as the real US college system; no one can achieve more than a perfect grade (1). By dividing the *IdealGoal* (1) with the *MinimumTimeNeeded* (four months), the *MaximumAchievementRate* is 0.25 per month. This way the *AchievementRate1* will never exceed 0.25 per month.

4.2.2 School learning

SchoolLearning1 is a variable from the Carroll model (1989). In this model, *school learning* is assumed to have a value ranging from zero to one.

SchoolLearning1 =(TimeWillingToSpend1/TimeNeeded1) FinalLearningAdjustment1*

To adjust for time constraints the *FinalLearningAdjustment1* was introduced as a hidden variable. This prevents the student from achieving anything after the semester is over:

FinalLearningAdjustment1 =IF(RemainingTimeForThisSemester1/1<<month>>>0,1,0)

The *FinalLearningAdjustment1* and other hidden variables will be discussed in more detail in chapter 4.3.

TimeNeeded1 is a function of the *MinimumTimeNeeded* (four months), and the students *Aptitude1*. One semester is four months and it is not possible to graduate any faster than that. So if a student has full aptitude (1):

TimeNeeded1 = MinimumTimeNeeded/Aptitude1

*Aptitude1 = QualityOfInstructions * InitialUpperLimitForStudentsAptitude * Perseverance1*

The *QualityOfInstructions* variable represents the institutional aspect of learning. This is the contribution of the professors and the facilities. This is assumed to be a constant 1.
The *InitialUpperLimitForStudentsAptitude* indicates the initial grade for the student admitted into the system. A student with an *InitialUpperLimitForStudentsAptitude* of 1 will need 4 months to reach his goal. Any student with lower *InitialUpperLimitForStudentsAptitude* will innately need more time to reach that same goal.
TimeWillingToSpend1 indicates how much time the student is willing to spend on his studies by traditional means of hard work and dedication. This time is determined by the model students *Perseverance1*.

4.2.3 The model students' motivation

The *Perseverance1* represents the students' motivation (Carroll, 1989) and determines how much time the student is willing to spend on his studies using tradition means of hard work and dedication:

*Perseverance1=DELAYINF(StudentsGoal*WeightOfStudentsGoal1+*
*(1-WeightOfStudentsGoal1)*AcademicAchivement1,InitialPersaveranceDelayTime,3,1)*

This equation was used by Barlas's and Yasarcan's 2005 in their model. In their case the variable *Perseverance1* is the implicit goal of the system.
In this case, *Perseverance1* indicates how motivated the model student is to reach his goal. Initially, all students start fully motivated (1). Depending on the *WeightOfStudentsGoal1*, students will become more or less motivated over the course of their academic carrier.
Perseverance1 is modeled as an information delay because the effect of the system on the students' motivation is not instantaneous. Because of the nature of information delays in

system dynamics, this can be viewed as a stock. If modeled as such there would a flow rate (*engagement rate* for example) and some more additional structure. However, the function of the variable would be the same so for the purpose of simplicity, *Perseverance1* is only one variable.

The *InitialPersaveranceDelayTime* is a student policy parameter and will be discussed later in chapter 5.1.1. It has a minimum value of 0.35 months. That means after roughly 0.35 months, the model student will start adjusting his motivation, depending on his performance.

Whatever the model students' goal may be, he will always place more or less emphasis on the stated goal depending on past and percent performance. By adjusting his expectations, the student forms a more realistic idea about his actual capabilities.

*WeightOfStudentsGoal1=DELAYINF(EffectOfAchivementOnWeight1*RefWeight*EffectOfPastPerformaceOnWeight1,WeightDelayTime,3,1)*

Again, *WeightOfStudentsGoal1* is an information delay where the past and the percent performance of the student are multiplied with a reference weight, *RefWeight* (1). The *WeightOfStudentsGoal1* variable can be said to represent the mindset of the student.

The *WeightDelayTime* has an initial value of 0.5 months. This is student policy parameter and will be discussed further in *chapter 5.1.2*.

EffectOfAchivementOnWeight1 a nonlinear graphical function where the students *MaximumAchivementGap1* is the input and determines part of the weight the student gives his goal. The effects of this are more confined to one particular semester and represent the percent condition for the student:

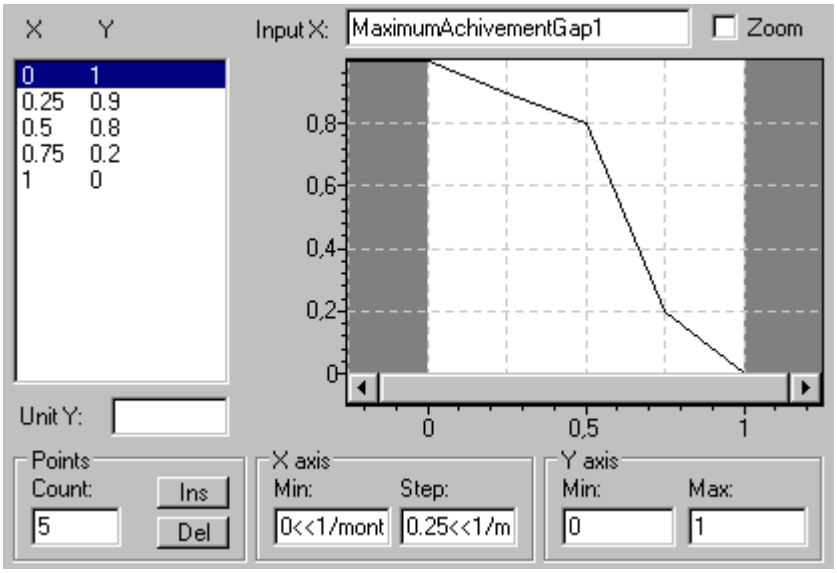

Figure 6 shows the effect the *MaximumAchivementGap1has* on the model students *WeightOfStudentsGoal1*.

The *MaximumAchivementGap1* indicates if the student is lagging behind or not. If the *DesiredAchievement1* is higher than the *MaximumAchievementRate*, the model student will clearly not reach his goal. Therefore he adjusts his expectations and gives less weight to his stated goal.

EffectOfPastPerformaceOnWeight1 is linear graphical function where the model students´ *InitialAchivementAdjustment* is the input and determines part of the weight the student gives his goal. This effect is on average throughout the model students' academic carrier and can be said to represent the students' personal history:

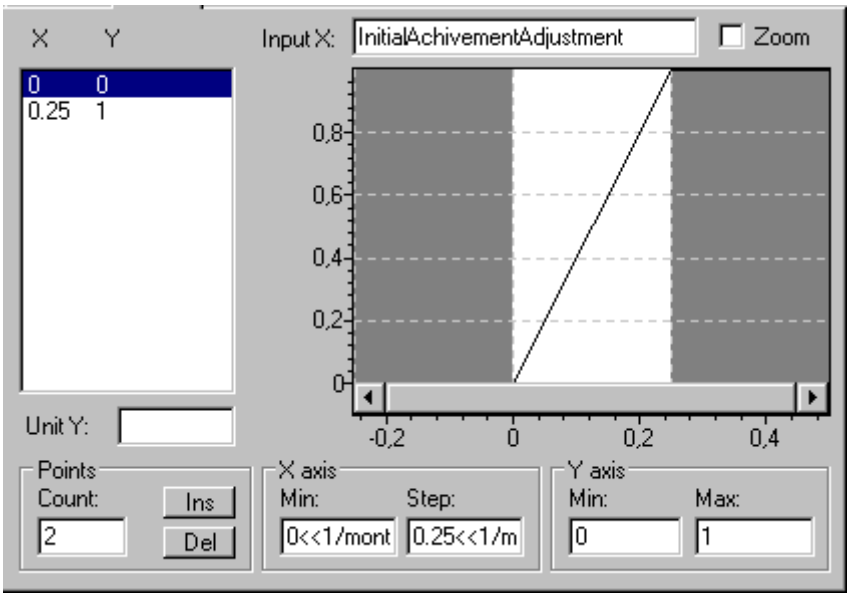

Figure 7 show the effect the model student AverageAchievementRate *has on the* WeightOfStudentsGoal1.

The value 0.25 per month is equal to the *MaximumAchivementRate*. If the student is performing optimally, he will give full weight (1) to the *StudentGoal*. However, if his achievement does not meet his expectations, he will adjust the weight he gives the goal.
The *InitialAchivementAdjustment* is a variable only found in the first semester. Because of problems dividing with zero this *if function* was necessary:

IF(SemesterAverageAchivementRate1=0<<1/month>>,AchivementRate1,SemesterAverageAchivementRate1)

The *SemesterAverageAchivementRate1* is the actual average achievement rate for the student:

SemesterAverageAchivementRate1 = AcademicAchivement1/UsedTimeThisSemester1

The *UsedTimeThisSemester1* is another if function because of zero:

IF(UsedTime1=0<<month>>,1<<month>>,UsedTime1)

The model is dividing what the model student has already achieved, the *AcademicAchivement1*, with the time he has done it in, the *UsedTime1*.

4.2.4 The model students´ grade

Grading a student is never easy, model or no model. One way of grading students is according to letters of the alphabet, A, B, C etc. This can correspond to grade scale of 0 – 10 where a student would get a perfect 10 with no wrong answer. When divided by 10 this grade scale can then go from zero to one in a similar manner. Therefore, the grade scale in this model goes from 0 – 1.

A variable of major interest is *Grade1*. If the students grade reaches the *MinimumGradeRequierment*, the student can advance in his studies and graduate to the next semester. The *MinimumGradeRequierment* is assumed to be 0.7.

A basic assumption regarding students is that all want to graduate. But in order to graduate a student must meet a certain *MinimumGradeRequirement*. If the model student does not reach the *MinimumGradeRequirement* he will not get a *SemesterPass1* of 1, and fail the semester.

SemesterPass1 = IF(ActiveGrade1<MinimumGradeRequirement,0,1)

The *MinimumGradeRequirement* is one of the variables of interest in relation to student policy and will be discussed further in chapter 5.1.3.

The model students *ActiveGrade1*, is assumed to be:

ActiveGrade1 = IF(CheatPolicySwitch=0,Grade1,ExpectedGradeWithCheating1)

*Grade1= AcademicAchivement1 * QualityOfInstructions*

So basically it is assumed that the student's academic gain through traditional means of hard work and dedication will determine the students grade because *QualityOfInstructions* = 1.
The *ExpectedGradeWithCheating1* and the *CheatPolicySwitch* are student policy variable and will discussed further in chapter 5.3.
Next semester, the *UpperLimitForStudentsAptitude2* will be determined by the students *AcademicAchivement1*, not the grade.

4.3 Hidden variables

Apart from the one hidden variable in the first semester, *FinalLearningAdjustment1*, two additional hidden variables are present in the second semester structure:

InitialLearningAdjustment2= IF(DepletionRate2=0,0,1)

and

AchivementGapTimeAdjustment2 = IF(UsedTime2/1<<month>>=0,0,1)

All of these hidden variables serve the purpose of stopping or starting certain structures, depending on how advanced the model student is in his academic carrier.

The *InitialLearningAdjustment2* prevents the model student from learning before the semester starts and the *AchivementGapTimeAdjustment2* makes sure that the student does not gain anything additional from cheating after the semester is finished.

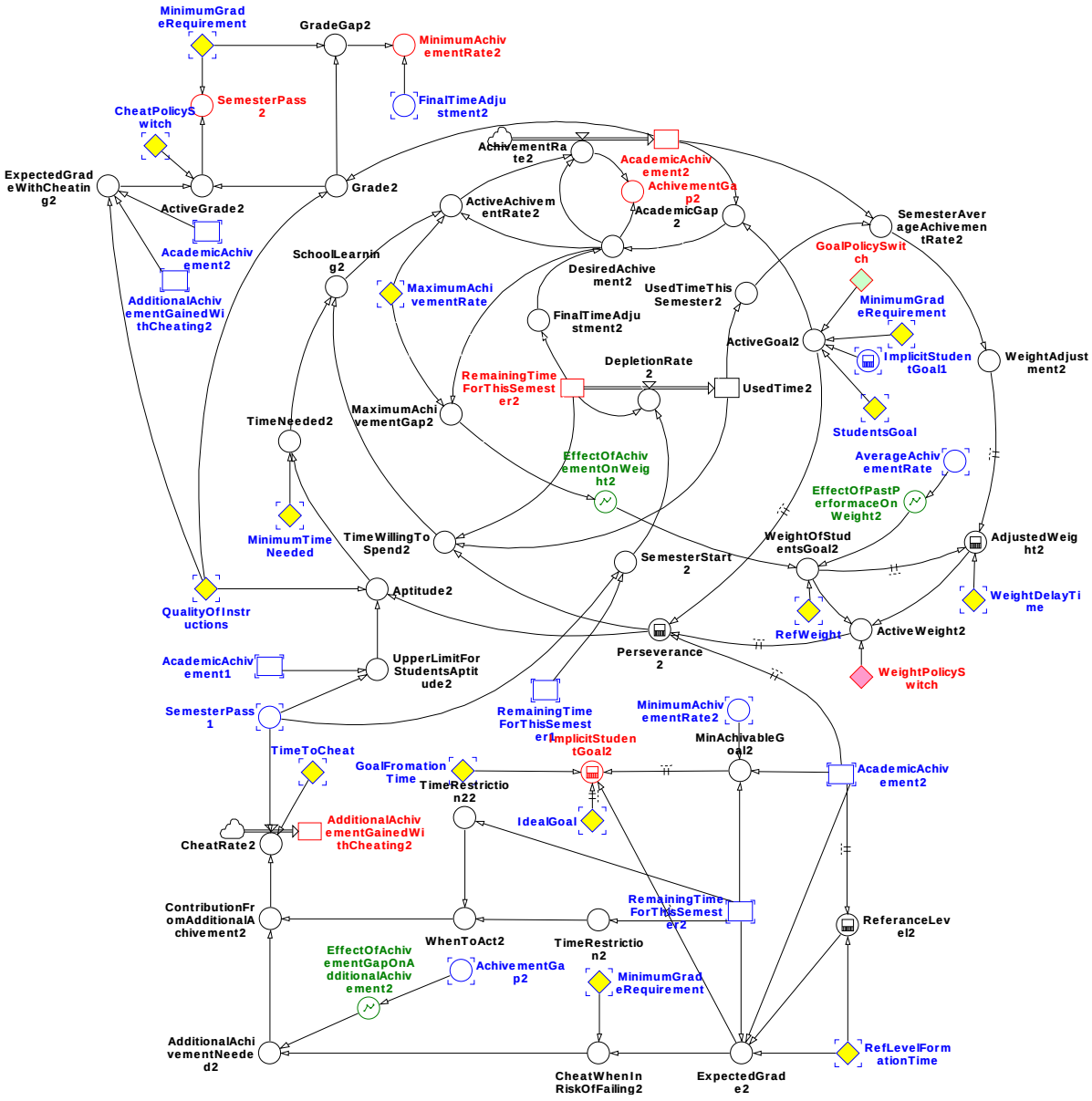

Figure 8 shows the individual structure for semesters two to seven.

4.4 Basic structure for semesters two to seven

In this section, the basic structure in *figure 9* will be described in detail. It applies to all model students, regardless of student policy.

The second semester will not start until the student gets the *SemesterPass1* = 1.

*UpperLimitForStudentsAptitude2 =AcademicAchivement1 * SemesterPass1*

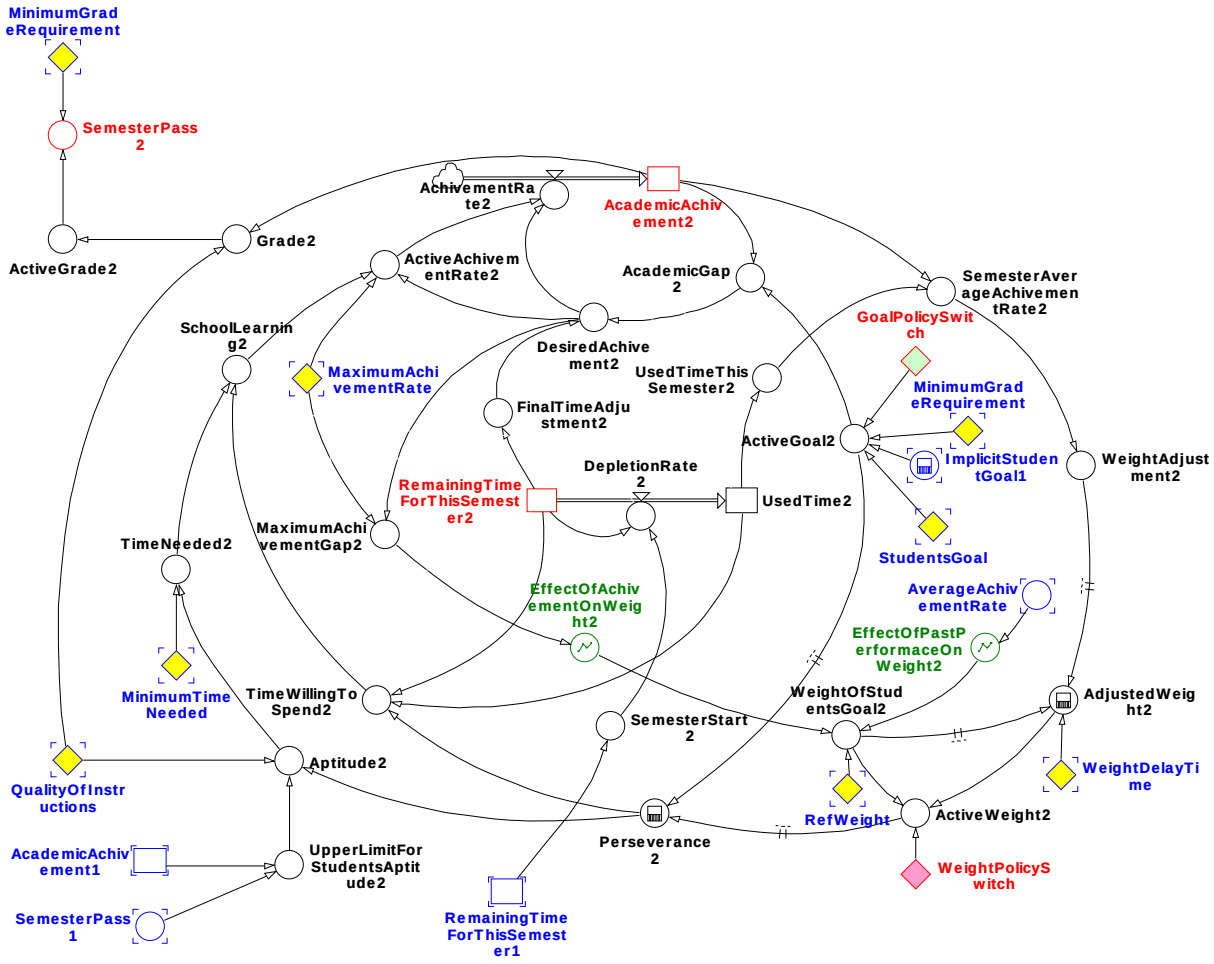

Figure 9 shows the basic structure for semester's two to seven that applies to all model students.

Now the upper limit for the model student's aptitude has been set by the student's performance from the previous semester.

Another difference from the first semester can be observed in the time structure:

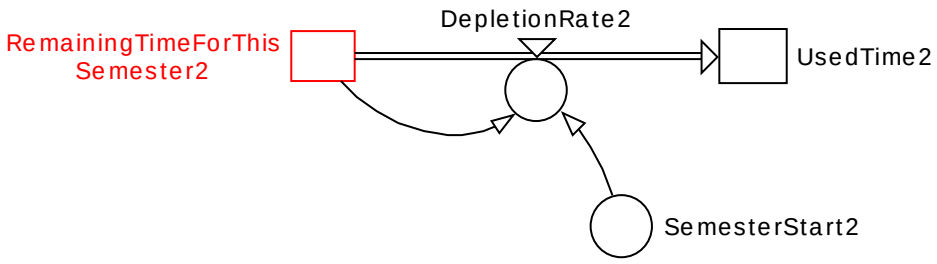

Figure 10 shows the time structure for semester's two to eight.

The equation for *SemesterStart2* indicates that if the model student has not reached the *MinimumGradeRequirement* and the previous semester has not over, the *DepletionRate2* will not flow and the next semester will never start for this student:

*SemesterStart2 = IF(RemainingTimeForThisSemester1/1<<month>>>0,0,1)*SemesterPass1*

The *DepletionRate2* is then also triggered by an *if* function:

*DepletionRate2= IF(RemainingTimeForThisSemester2<=0<<month>>,0,1)*SemesterStart2*

The equation for the model students' perseverance is the same for semesters 2 – 8:

*Perseverance2=DELAYINF(ActiveGoal2*ActiveWeight2+(1ActiveWeight2)*
**AcademicAchivement2,0.35<<month>>,3)*

The only difference now from the first semester is that the delay time for the model students' motivation is a constant 0.35 months.

The *ActiveGoal2* is a variable not percent in the first semester structure. Depending on the students' strategy, different goals will be dominant within the system. This will be discussed in more detail in chapter 5.2.

WeightOfStudentsGoal2 is not an information delay in the second semester. The student does not adjust between semesters and starts the next semester with the same weight on his goal as he finished the previous semester.

WeightOfStudentsGoal2=EffectOfAchivementOnWeight2
**EffectOfPastPerformaceOnWeight2*RefWeight*

The *AverageAchivementRate* is an average variable and will be discussed later in chapter 4.6.

As mentioned previously, the model structure for semester's two to seven is identical. The difference between these semesters and the last semester will be pointed out in the next chapter.

4.5 Semester eight

The structure for last semester in the model student is only slightly different from the structure in semester's two to seven. The only difference is that variables like the *ActiveGrade* are absent because now the student will exit the system if he reaches the *MinimumGradeRequirement*.

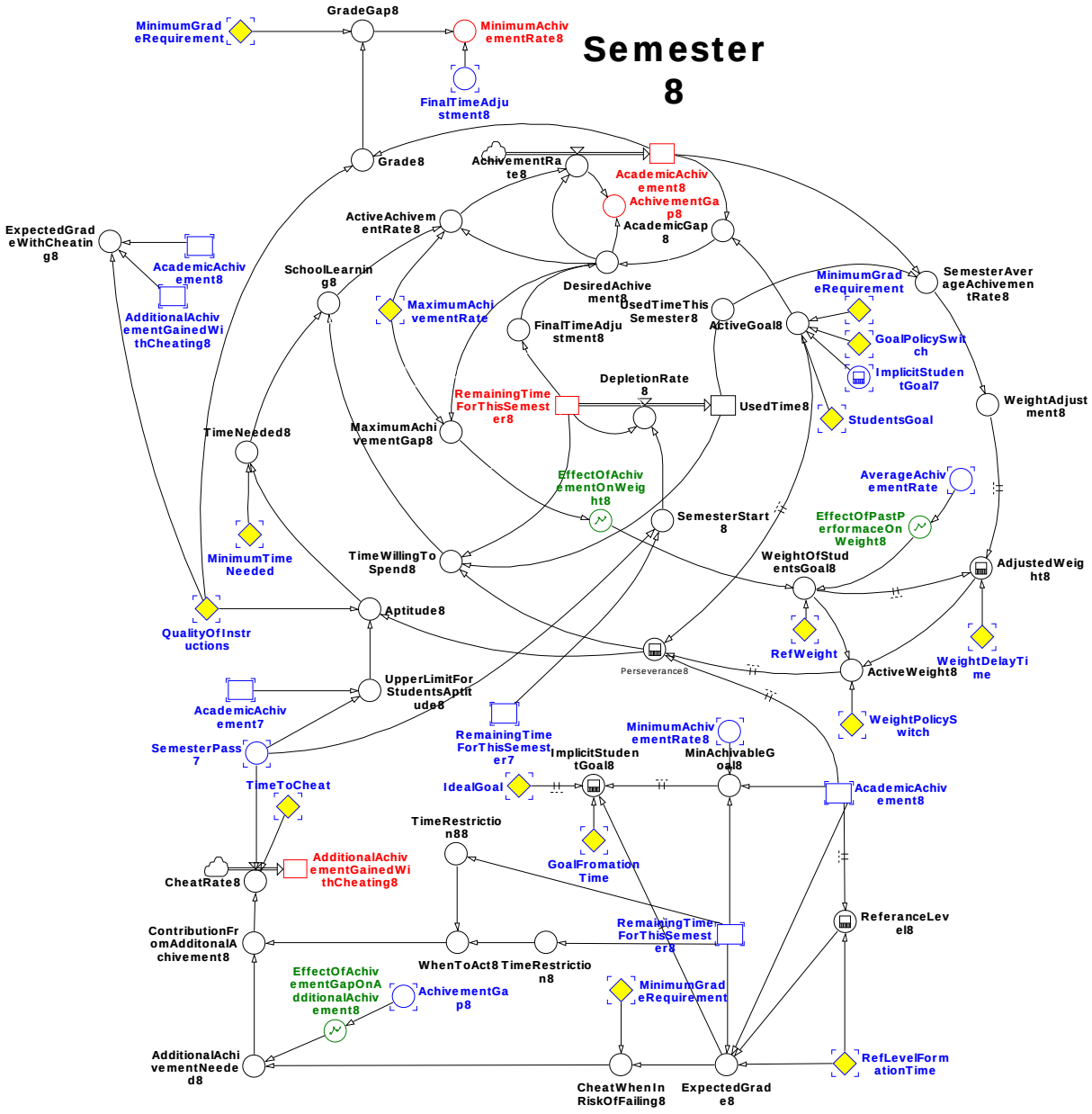

Figure 11 shows the individual structure for the last semester.

4.6 The average structures

Two average structures play a part of this model. The first one calculates the model students *average achievement rate* as well as his *cumulative average grade*.

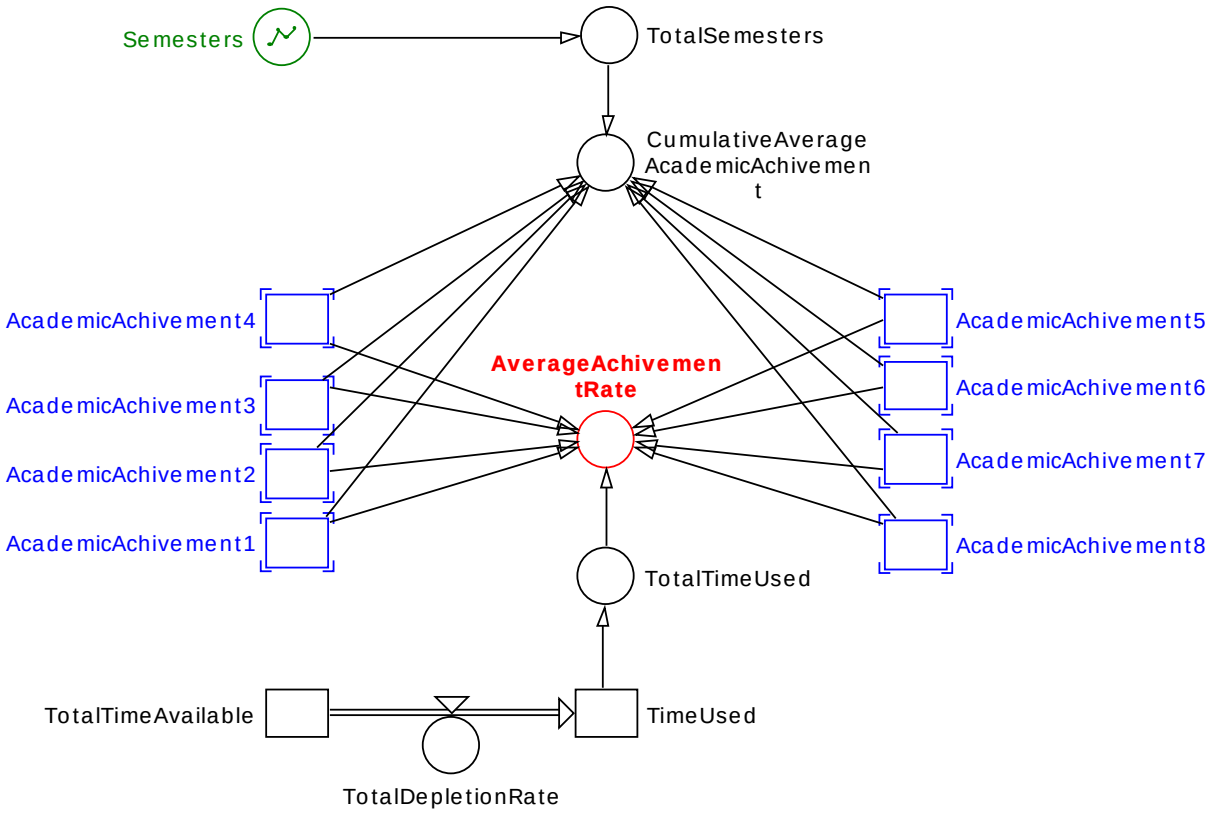

Figure 12 shows the structure that calculates the model students average achievement rate as well the students' average grade.

AverageAchivementRate=(AcademicAchivement1+AcademicAchivement2
+AcademicAchivement3+AcademicAchivement4
+AcademicAchivement5+AcademicAchivement6
+AcademicAchivement7+AcademicAchivement8)/TotalTimeUsed

The *AverageAchivementRate* is the input *EffectOfPastPerformaceOnWeight2* throughout the model students' studies.

Semesters, is a linear graphical function that denotes how far the model student has advanced in his studies. Initially it starts out as zero and at the end of the simulation *Semesters* has the value of eight.

TotalSemesters = IF(Semesters=0,1,Semesters)

The *CumulativeAverageAcademicAchivement* can then be calculated:

CumulativeAverageAcademicAchivement=(AcademicAchivement1
+AcademicAchivement2+AcademicAchivement3
+AcademicAchivement4+AcademicAchivement5
+AcademicAchivement6+AcademicAchivement7
+AcademicAchivement8)/TotalSemesters

The *CumulativeAverageAcademicAchivement* is representative for the students' average grade. The stock and flow structure at the bottom of *figure 12* also indicates how advanced the model student is in his studies. Initially *TotalTimeAvailable* = 32 months because a normal student will graduate in 32 months.

The *TotalDepletionRate* = 1 month per month and indicates the passing of time in the model students' academic carrier.

Initially *TimeUsed* = 0. That stock connects to the *TotalTimeUsed.* That is another variable where the initial conditions of the system have to be taken into consideration:

TotalUsedTime = IF(TimeUsed=0<<month>>,1<<month>>,TimeUsed)

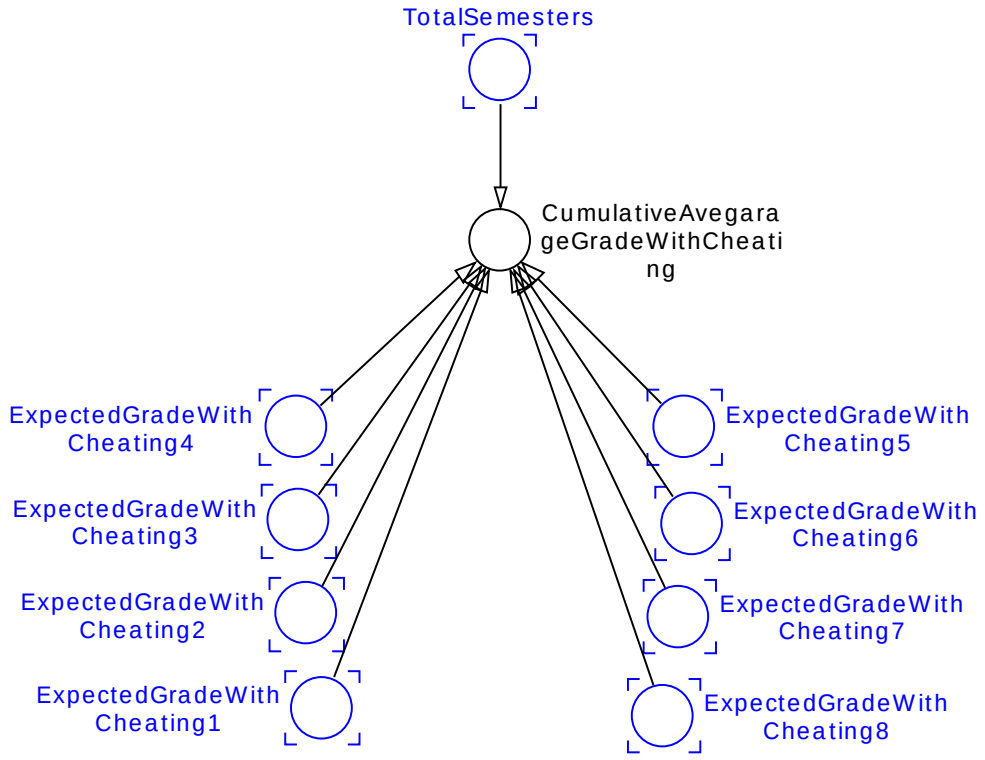

Figure 13 shows the structure that calculates the model students' cumulative average grade with cheating.

CumulativeAvegarageGradeWithCheating=(ExpectedGradeWithCheating1+ExpectedGrade WithCheating2+ExpectedGradeWithCheating3+ExpectedGradeWithCheating4+ExpectedGr adeWithCheating5+ExpectedGradeWithCheating6+ExpectedGradeWithCheating7+Expected GradeWithCheating8)/TotalSemesters

This indicates what average grade the model student would get if he would implement a cheating policy.

4.7 Model tests

Various tests suggested by Forrester (1973) were performed on the model. Testing of a SD model is a constant process where the results from every simulation can either support or reject the hypothesis. To name a few of the tests conducted:

- Structural verification test
- Parameter verification test
- Extreme condition test
- Parameter sensitivity test
- Family member test
- Integration error test

All these tests aim at verifying the model as a useful tool for analysis and relating it to real life. The model reproduces values that are consistent with real life values. Each equation has been revised to make sure they are not violations of physical laws under different kinds of conditions (Sterman, 2000).

5 Policy structures

Apart from the basic structure discussed in chapter 4, there is an additional structure available that each model student can choose to implement in order to advance his academic carrier. The different offers available to the model student in his first semester will be outlined here.

The first three policies structures are basically just parameters. The two first parameters lie within the student himself in the form of time. The last one, lies within school authorities and the systems requirements.

In addition to these parameters, three dynamic structures are a part of the basic structure in *figure 4*. The first structure described involves the model students' goal. Depending on what type of goal a model student sets for himself, different structures within the model will be operating.

The second policy structure mentioned is the cheat structure and the third one is the adjusted weight structure. Depending on the model students' intentions, different structures within the model will be operating.

5.1 Policy structures for the first semester

5.1.1 Perseverance delay parameter

The *InitialPersaveranceDelayTime* represents how perseverant the model student is at the beginning of his studies. The base value for the *InitialPersaveranceDelayTime* is 0.35 months. That means if the student starts out fully motivated he will start to adjust to the dynamics within the system after roughly 0.35 months. However, more determined students can prevail for a longer period of time before adjusting to the dynamics.

Figure 14 shows the InitialPersaveranceDelayTime *variable, in the individual structure from the first semester in* figure 3.

5.1.2 Weight delay parameter

In the first semester the model student can adjust quickly or slowly to the dynamics within the system. The *WeightDelayTime* is initially set to 0.5 months, indicating that the model students

WeightOfStudentsGoal1 will become to the dynamics after about two weeks. However, a more focused student can endure for a longer period of time before adjusting to the dynamics.

Figure 15 shows the WeightDelayTime *variable, in the individual structure from the first semester in* figure 3.

5.1.3 Minimum grade parameter

By default the *MinimumGradeRequirement* is set to 0.7. This is the minimum grade a student must meet if he wants to advance in his studies. However, some institutions may have higher minimum requirements than 0.7 and some students have more ambitions than others. For example, a student on full scholarship may need a higher grade than a normal student to keep his status.

Figure 16 shows the MinimumGradeRequirement *variable, in the individual structure from the first semester in* figure 3.

5.2 Goal policy structures

The goal is a determining factor when it comes to student policy. A constant goal policy implies that the student sets his goal at the start of his studies and keeps it constant throughout. An implicit goal means that the student adjusts his goal after every semester, depending on his performance the previous semester.

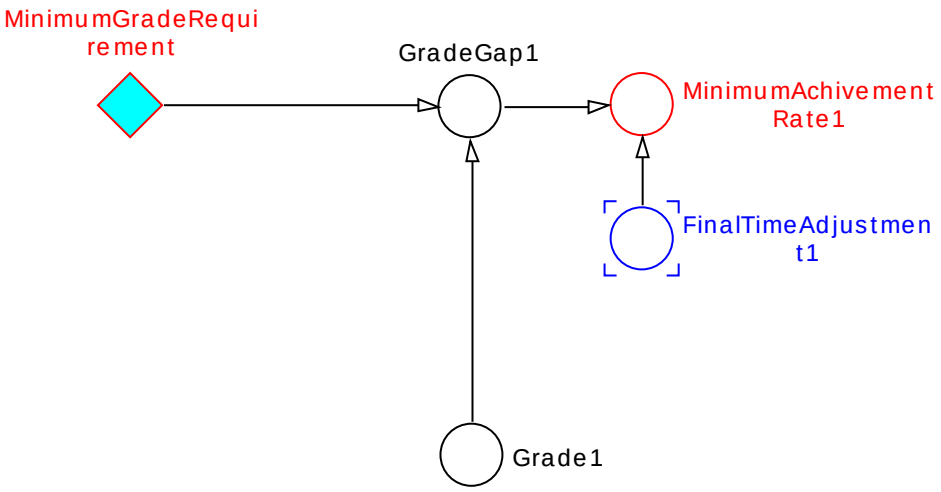

Figure 17 shows how the minimum achievement rate is calculated.

5.2.1 Implicit goal structure

In order to integrate the model students' goal, the *minimum achievement rate* must be known. The variable *GradeGap1* is the difference between the *Grade1* and the *MinimumGradeRequierment*. Given the size of this gap and the *RemainingTimeForThisSemester1*, the students *MinimumAchivementRate1* can be derived at:

MinimumAchivementRate1 = GradeGap1/FinalTimeAdjustment1

This indicates the minimum achievement the student must accomplish in order to graduate to the next semester.

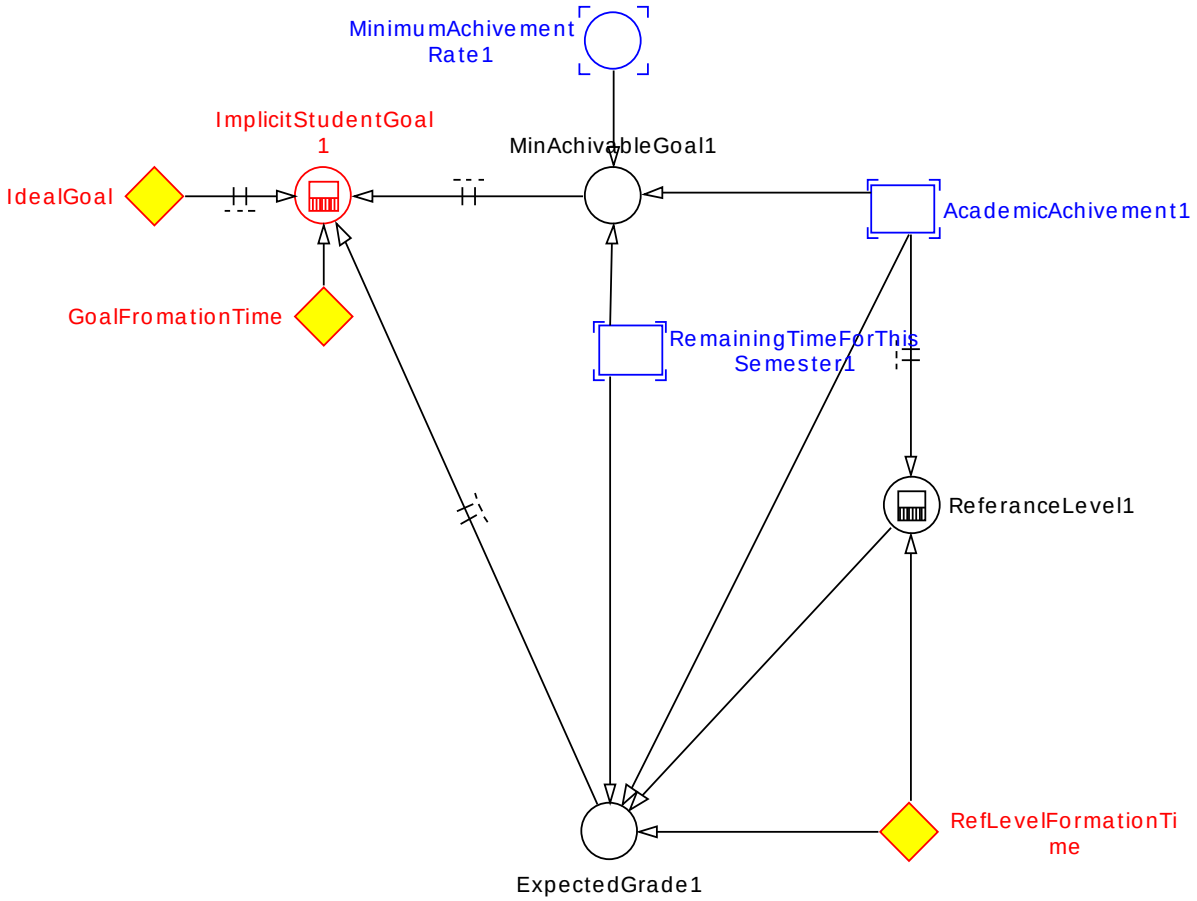

Figure 18 shows the structure for the implicit goal.

The *MinimumAchivementRate1* connects to the *MinAchivableGoal1*:

*MinAchivableGoal1=AcademicAchivement1+MinimumAchivementRate1*RemainingTimeFor ThisSemester1*

This variable indicates the minimum goal the model student should set for himself in the next semester.

The equation for the *ImplicitStudentGoal1* is from Barlas's et al. (2005). It is a first order information delay because the effects of the system on this variable are not instantaneous:

ImplicitStudentGoal1=DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade1,MinAchivableGoal 1)),GoalFromationTime,1)

The *IdealGoal* = 1. That is the best possible grade a student can get.

The *GoalFormationTime* indicates how quickly the model student adjusts his implicit goal. The *GoalFormationTime* is set equal to 0.35 months.

5.2.2 Constant goal structure

One strategy a student can implement is having a constant goal of what he wants to achieve during his academic carrier. If the student starts out highly motivated and wants to strive for excellence, then *StudentGoal* would equal 1. A student with less ambitions would then set his goal lower than 1.

Figure 19 shows the StudentGoal variable, in the individual structure from the first semester in figure 3.

The model students' goal policies will be discussed further in chapter 5.4.2.

5.3 Cheat structure

One strategy the model student can choose to implement in order to advance his academic carrier is cheating. Then the structure in *figure 20* will benefit the model student especially. *AchivementGap1* is the basic input for the cheat structure in the model. The *AchivementGap1* is the gap between what the model student should be doing to achieve his goal (*DesiredAchievement1*) and what he is actually doing (*AchievementRate1*).

AchivementGap1 = DesiredAchivement1-AchivementRate1

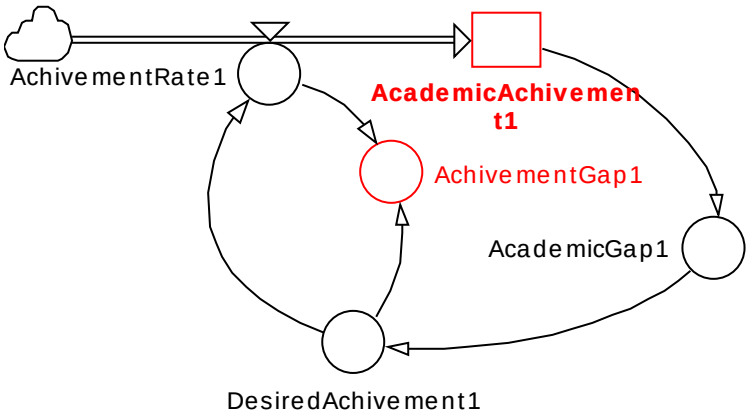

Figure 20 shows where the achievement gap is formed.

The *EffectOfAchivementGapOnAdditionalAchivement1* is a nonlinear graphical function that indicates how much of the *AchivementGap1* the model student can close by cheating:

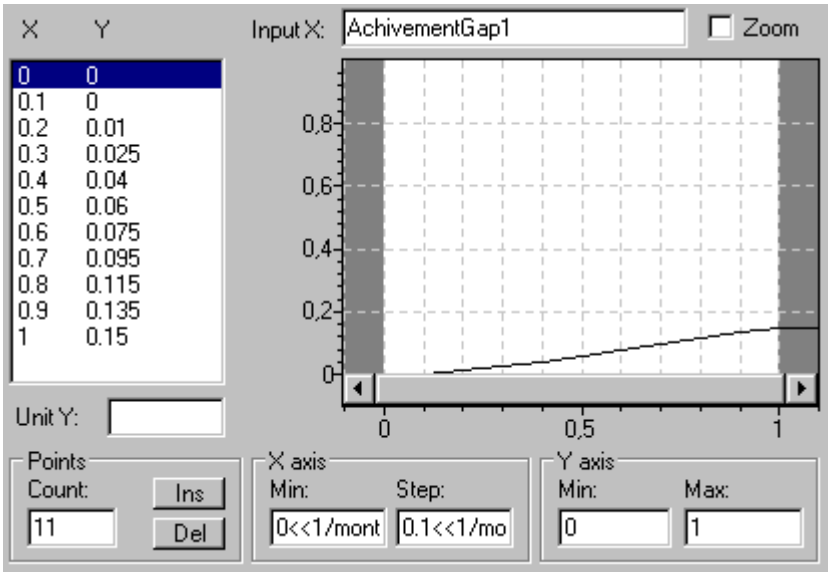

Figure 21 shows the effect the achievement gap has on the model students' additional achievement.

If there no gap, the student will have no reason to cheat. It is assumed that no matter how big the *AchivementGap1* is, only a small part, 0.15 per month, can be closed with cheating.
The *AdditionalAchivementNeeded1* implies what the student needs to do in order to advance to the next semester:

AdditionalAchivementNeeded1=IF(CheatWhenInRiskOfFailing1>0,EffectOfAchivementGapOnAdditionalAchivement1,CheatWhenInRiskOfFailing1)

It is assumed that only so much can be accomplished by cheating. The *ContributionFromAdditonalAchivement1* is a variable that limits the contribution of cheating:

ContributionFromAdditonalAchivement1=IF(WhenToAct1=1,AdditionalAchivementNeeded1,0)

WhenToAct1 is another constraining variable, limiting the time the student can cheat to one particular semester:

WhenToAct1 =IF(RemainingTimeForThisSemester1/1<<month>>=0,0,1)

The *AdditionalAchivementGainedWithCheating1* is stock that indicates how much a student has gained from cheating.

The inflow for the *AdditionalAchivementGainedWithCheating1* is the *CheatRate1*. That represents the alternative means that the model student can utilize to achieve his goal (Merton, 1968):

CheatRate1 = ContributionFromAdditonalAchivement1/TimeToCheat

TimeToCheat is assumed to be one month because on average a model student will wait one month before he decides to cheat.

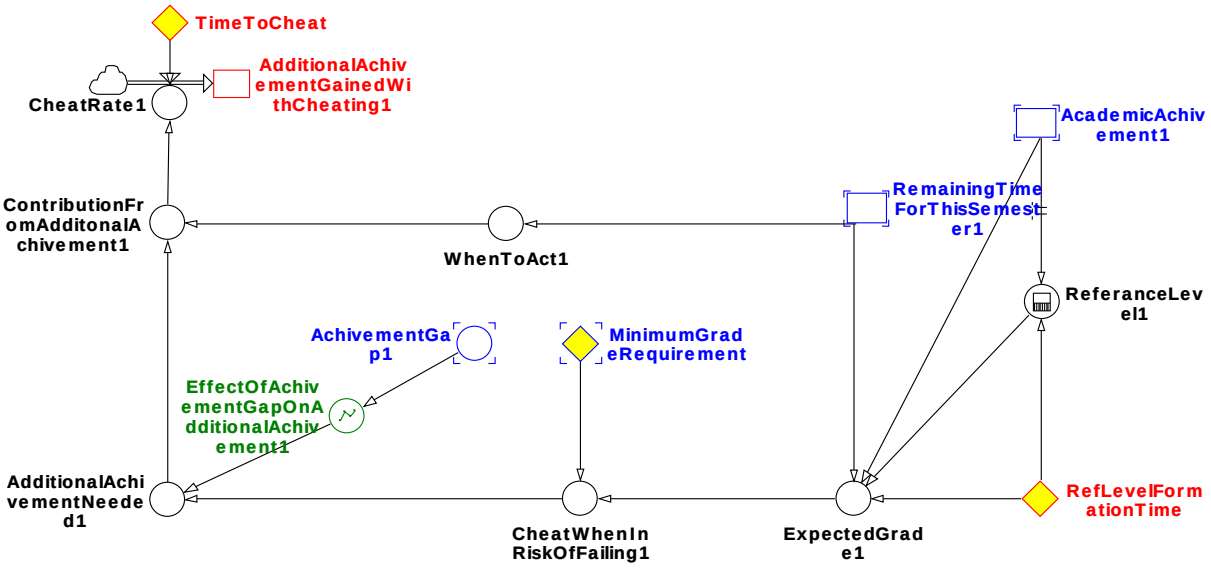

Figure 22 shows the cheat structure.

CheatWhenInRiskOfFailing1 is the variable that makes it possible for the model student to cheat. If the model expects to fail the semester, he will cheat to prevent that from happening:

CheatWhenInRiskOfFailing1= IF(ExpectedGrade1<ActiveMinimum,1,0)

If the student does not expect to get a grade sufficient to advance him to the next semester, he will cheat.

The *ExpectedGrade1* is a variable from the implicit goal model (2005). In that case, this variable is used to represent goal achievable given the past trend. In this case the variable represents what grade the model student can expect, given his past performance:

*ExpectedGrade1=AcademicAchivement1+((AcademicAchivement1-ReferanceLevel1)/RefLevelFormationTime)*RemainingTimeForThisSemester1*

The *RefLevelFormationTime* is assumed to be constant one month. It takes on average one month for the model student to form his belief about his performance.
The *ReferanceLevel1* is a simple third order information delay where the student adjusts his expectations depending on his performance:

ReferanceLevel1 = DELAYINF(AcademicAchivement1,RefLevelFormationTime,3)

The model students *ExpectedGradeWithCheating1* is a variable special interest:

*ExpectedGradeWithCheating1=AcademicAchivement1*QualityOfInstructions+AdditionalAchivementGainedWithCheating1*

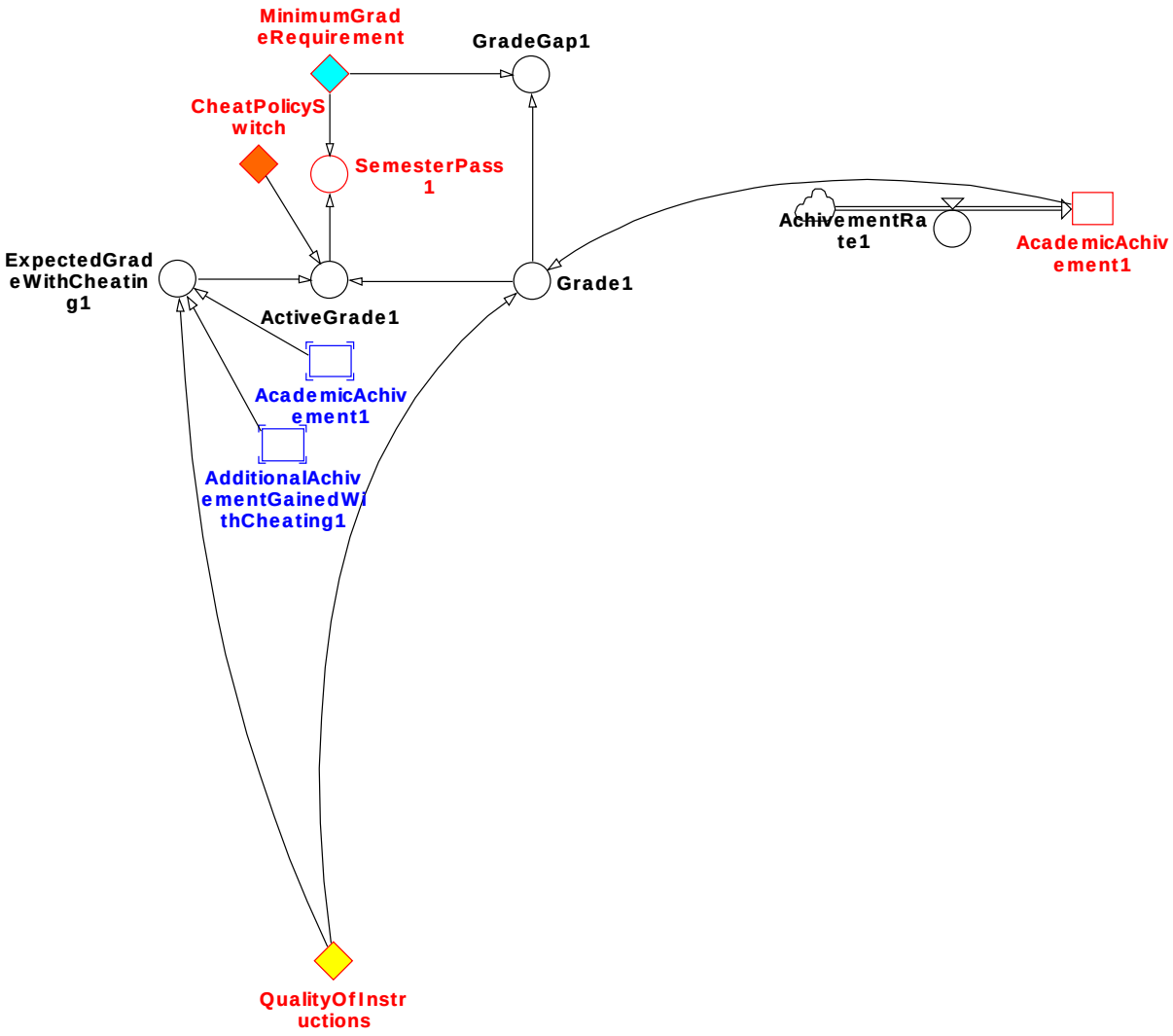

Figure 23 shows how the grade structure is influenced by cheating.

The *ExpectedGradeWithCheating1* is the model students grade in relation to what he actually achieved during the semester using traditional means of hard work and dedication (*AcademicAchivement1* QualityOfInstructions)*, plus what the student gained by cheating (*AdditionalAchivementGainedWithCheating1)*

If the *CheatPolicySwitch* = 1 then the students *ActiveGrade1* will equal *ExpectedGradeWithCheating1*. If the *CheatPolicySwitch* = 0, then the *ActiveGrade1* will equal *Grade1*.

If the model student is a cheat, his grade will be higher than what he actually achieved academically from the previous semester using traditional means of hard work and dedication. There will be distortion in the traditional student evaluation process (Magnus et al., 2002). The model student can in that case achieve less than the minimum required, but still graduate.

5.4 Policy structure for semesters two to eight

Not all student policies apply equally to all semesters. That is why additional variables had to be included in the following semesters.

5.4.1 Adjusted weight structure for semesters two to eight

After the first semester the model student can decide to keep the same pace regarding his hard work and dedication, or he can adjust. One way for the student to adjust is to give more weight to his goal. By keeping high standards of maximum achievement every semester, a model student can adjust the weight he puts on the goal by putting in more time. Instead of starting every semester exactly like the last one, the student can start every semester fully motivated and willing to achieve more.

If the *WeightPolicySwitch* = 1 then the model student will regenerate himself during the semester break and start the next semester fully motivated and more determined to achieve his goal. If the *WeightPolicySwitch* = 0, the model student will continue the next semester with the same mindset he finished the previous semester.

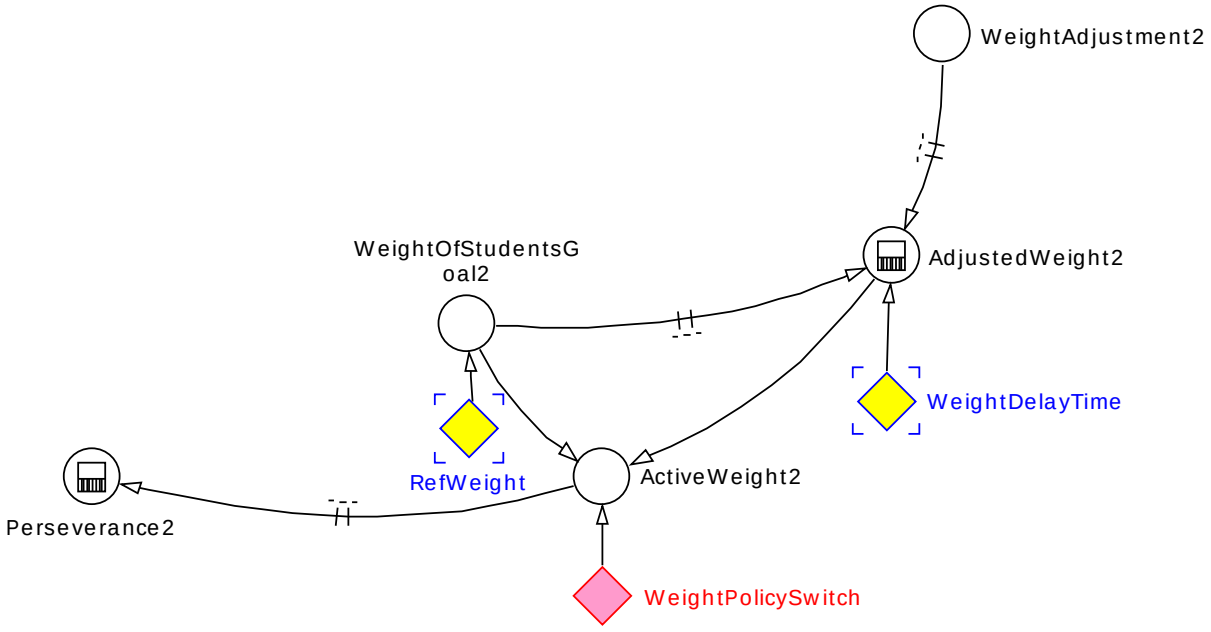

Figure 24 shows the weight policy structure for semester's two to eight.

The *WeightAdjustment2* is an *if function* that activates the weight structure.

*WeightAdjustment2= IF(SemesterAverageAchivementRate2*1<<month>>>0,0,1)*

The *AdjustedWeight2* has taken over the information delay from the *WeightOfStudentsGoal2*:

AdjustedWeight2=DELAYINF(IF(WeightAdjustment2>WeightOfStudentsGoal2,
WeightAdjustment2,WeightOfStudentsGoal2),WeightDelayTime,3).

and

*WeightOfStudentsGoal2=EffectOfAchivementOnWeight2*EffectOfPastPerformaceOnWeight 2*RefWeight*

The *ActiveWeight2* then determines what strategy the model student implements this semester:

ActiveWeight2 = IF(WeightPolicySwitch=0,WeightOfStudentsGoal2,AdjustedWeight2)

5.4.2 Goal structure for semesters two to eight

In order to take into account different types of goals, the *ActiveGoal2* had to be introduced:

ActiveGoal2=IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal1,
MinimumGradeRequirement))

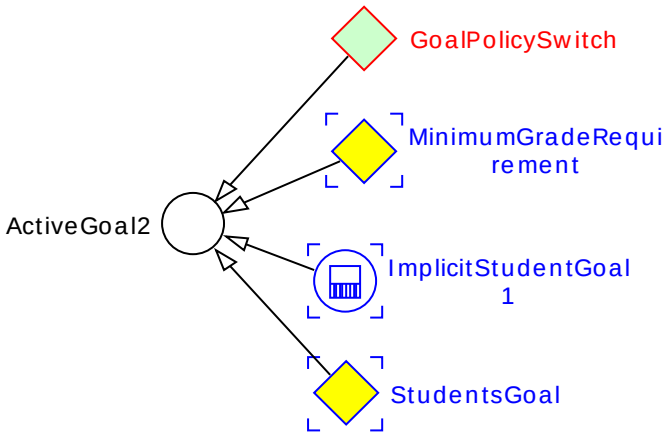

Figure 25 shows the goal structure for semester´s two to eight.

If the *GoalPolicySwitch* = 1, the model student will have an implicit goal. This implicit goal will never be lower than the MinimumGradeRequirement. If the *GoalPolicySwitch* = 0, the model student will have a constant set goal of 1 or less.
Depending on the model students' specifications, different goals will be active within the system.

5.5 Feedback loops

When a variable has an effect on its own development in the future it is called a feedback (Sterman, 2000). Feedback loops can either be self-reinforcing (+) or self-correcting (-).
In all there are 19 feedback processes operating within the system affecting the models students' academic achievement. The causal loop diagrams (CLD's) in the following chapters will identify these feedbacks and categorize the accordingly. Different student policies will then be related to specific feedback loops.

5.5.1 Color scheme and description for the feedback loops

Each loop has its own unique name and a color. The names go in a numerical sequence from 1 – 19, *loop 1*, *loop 2* etc. The color scheme denotes where a specific feedback loop gets it unique connections from. Black lines in the CLD indicate connections that are utilized by multiple feedback loops.

If an arrow has a plus (+), then the first variable will have a positive effect on the later. In one increases, the other increases. If one decreases, the other decreases. If an arrow has a minus (-), then change in the first variable will have a negative effect of the latter. If one increases, the other decreases. If one decreases, the other increases.

Special attention should be paid to the square lines in some of the connections. These represent delays in the system and can vary from 0.35 months to one semester.

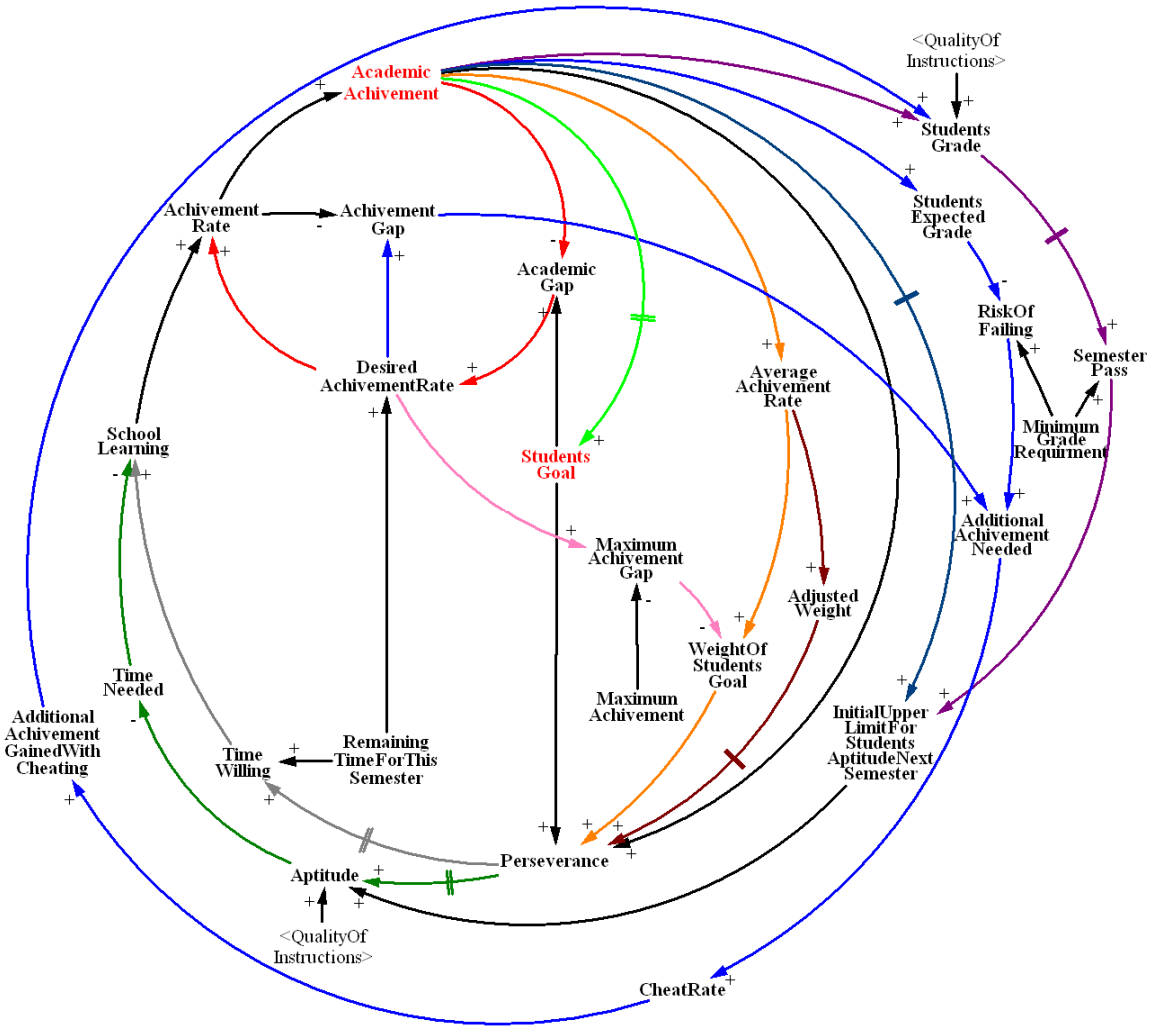

Figure 26 shows all the nineteen feedbacks available for model students.

5.5.2 The basic feedbacks

Without any additional strategies, all model students are subject to nine different feedback processes each semester. In this case, the model student uses no additional policies to enhance his academic achievement. Each loop flows from the *AcademicAchievement* to the *AchievementRate*.

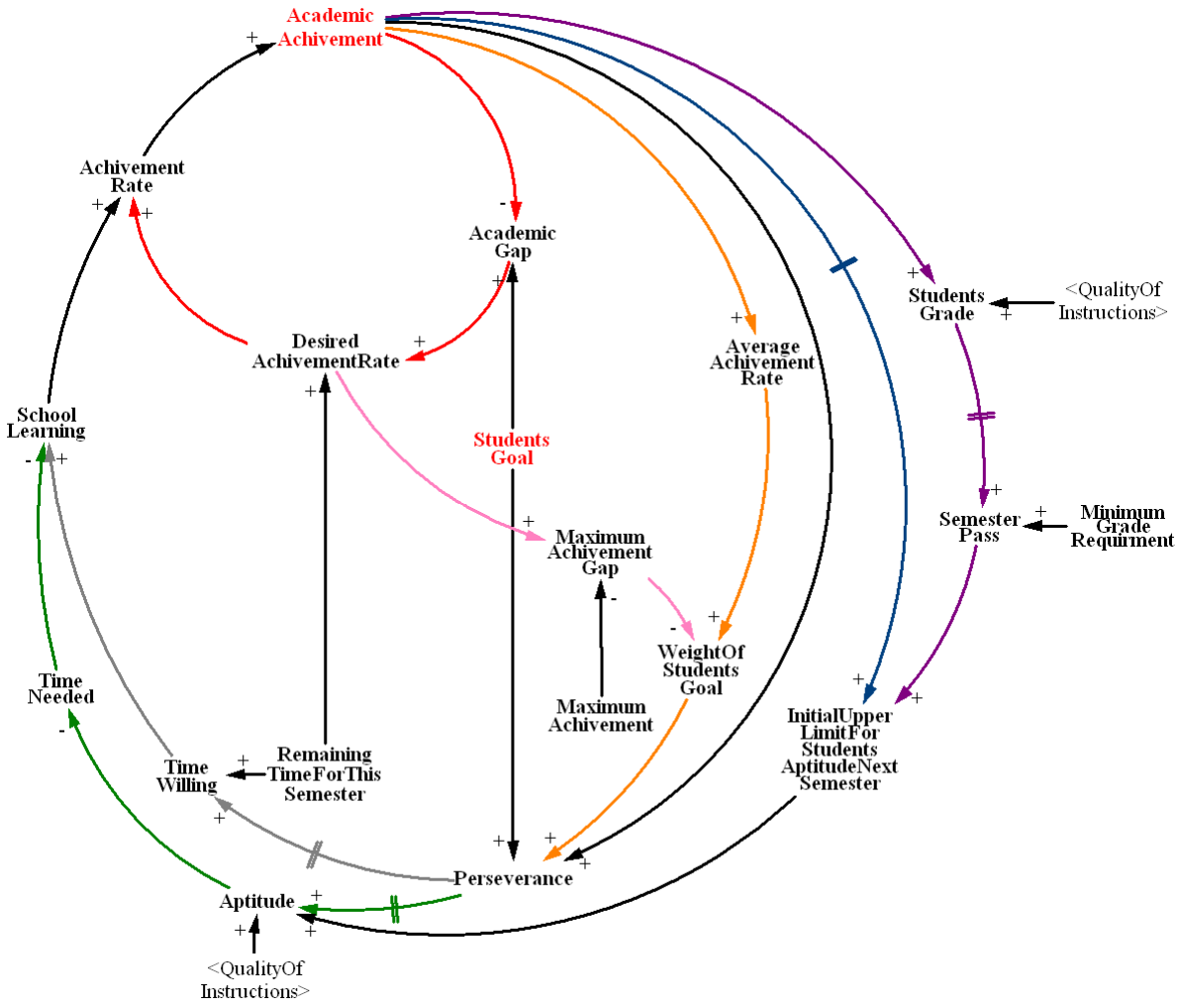

Figure 27 shows the nine basic feedbacks operating within the system at all times, regardless of student policies. The model students' goal is at the center of the feedbacks.

5.5.2.1 Loop 1

AcademicAchivement -AcademicGap +DesiredAchivementRate+AchivementRate

This is the only goal seeking loop in the basic structure. The *AcademicGap* is the difference between what the model students wants (the *StudentsGoal*) and what he has (the

AcademicAchievement). If the gap is big, the *DesiredAchievementRate* will be high. And if the *DesiredAchievementRate* high, the *AchievementRate* will increase, adding to the model students *AcademicAchievement*. As soon as the model student starts to achieve something, the *AcademicGap* will start to decease, eventually slowing down the model student *AchievementRate* and stabilizing the system.

5.5.2.2 Loop 2

AcademicAchivement+Persaverace+TimeWilling+SchoolLearning+AchivementRate

This is a reinforcing loop. A reinforcing loop could grow exponentially in any direction if there were no restrictions (Sterman, 2000). From there the *AcademicAchievement* has a positive effect on the model students *Perseverance*, making him more willing to invest time in *SchoolLearning* using traditional means of hard work and dedication. The *SchoolLearning* will then have a positive effect of the model students *AchievementRate.*

5.5.2.3 Loop 3

AcademicAchivement+Persaverace+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

This is the second reinforcing loop. The model students *Perseverance*, has a positive effect on the model students *Aptitude*, making him more diligent and productive. As the model students *Aptitude* increases, he will need less time to achieve his goal. As he needs less time, *SchoolLeaning* will increase, adding to the model students *AcademicAchievement.*

From the model students *Perseverance, loops 2* and *3* supply the connections for the basic loops *4, 5, 6, 7* and the policy loops, *10, 11, 12, 13, 14, 15, 16, 17* and *18*.

5.5.2.4 Loops 4 and 5

AcademicAchivement+AverageAchivementRate+WeightOfStudentsGoal+Persaverace+Time Willing+SchoolLearning+AchivementRate

AcademicAchivement+AverageAchivementRate+WeightOfStudentsGoal+Persaverace+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

These loops are both reinforcing. If the model students *AcademicAchievement* increases, his *AverageAchievementRate* will also increase. By improving, he places more *WeightOnStudentsGoal*, making him even more motivated to achieve something academically using traditional means of hard work and dedication. From the model students *Perseverance*, *loop 4* affects *TimeWilling* and *loop 5 TimeNeede,* following the same basic pattern as *loops 2 and 3*.

5.5.2.5 Loops 6 and 7

AcademicAchivement-
AcademicGap+DesiredAchivementRate+MaximumAchivementGap+WeightOfStudentsGoal+
Persaverace+TimeWilling+SchoolLearning+AchivementRate

AcademicAchivement-
AcademicGap+DesiredAchivementRate+MaximumAchivementGap+WeightOfStudentsGoal+
Persaverace+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

There is a gap between what the model student should be doing (*DesiredAchivementRate)* and what he could be doing (*MaximumAchievement*). This *MaximumAchievementGap* has a negative effect on the *WeightOnStudentsGoal.* Regardless of what the model student actually is doing (*AchivementRate*), if he should be doing more than actually possible he will get discouraged and adjust the weight he puts on the *StudentsGoal*. From there *loop 6* will affects *TimeWilling* and *loop 7 TimeNeede,* following the same basic pattern as *loops 2* and *3*.

5.5.2.6 Loop 8

AcademicAchivement+StudentsGrade+SemesterPass+InitialUpperLimitForStudentsAptitude
NextSemester+Aptitude+TimeNeeded+SchoolLearning+AchivementRate

This is the loop that propels the model student into the next semester. If the model students' grade is high enough, he will get a semester pass and start the next semester with a new value for his *Aptitude*. The upper limit for the model students *Aptitude* will be determined by the students' *AcademicAchievement* from the previous semester.

5.5.2.7 Loop 9

AcademicAchivement+InitialUpperLimitForStudentsAptitudeNextSemester+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

This loop has a delay of one semester. After the first semester the model students *InitialUpperLimitForStudentsAptitudeNextSemester* will be determined by the model students *AcademicAchivement*, not the grade.

5.5.3 Policy loops

Apart from the 9 basic loops operating at all times, there are 10 alternative loops available that the model student can implement in order to advance in his academic carrier. These are called policy loops and do not apply to all model students equally.

5.5.3.1 Implicit goal loops

By adding one connection to the CLD (from the *AcademicAchievement* to the *StudentsGoal*), five new feedback loops are introduced. In this case the model student has decided on an *implicit goal policy (IGP)*. Now the model students goal is not set as constant but rather determined by the models students own academic achievement each semester.

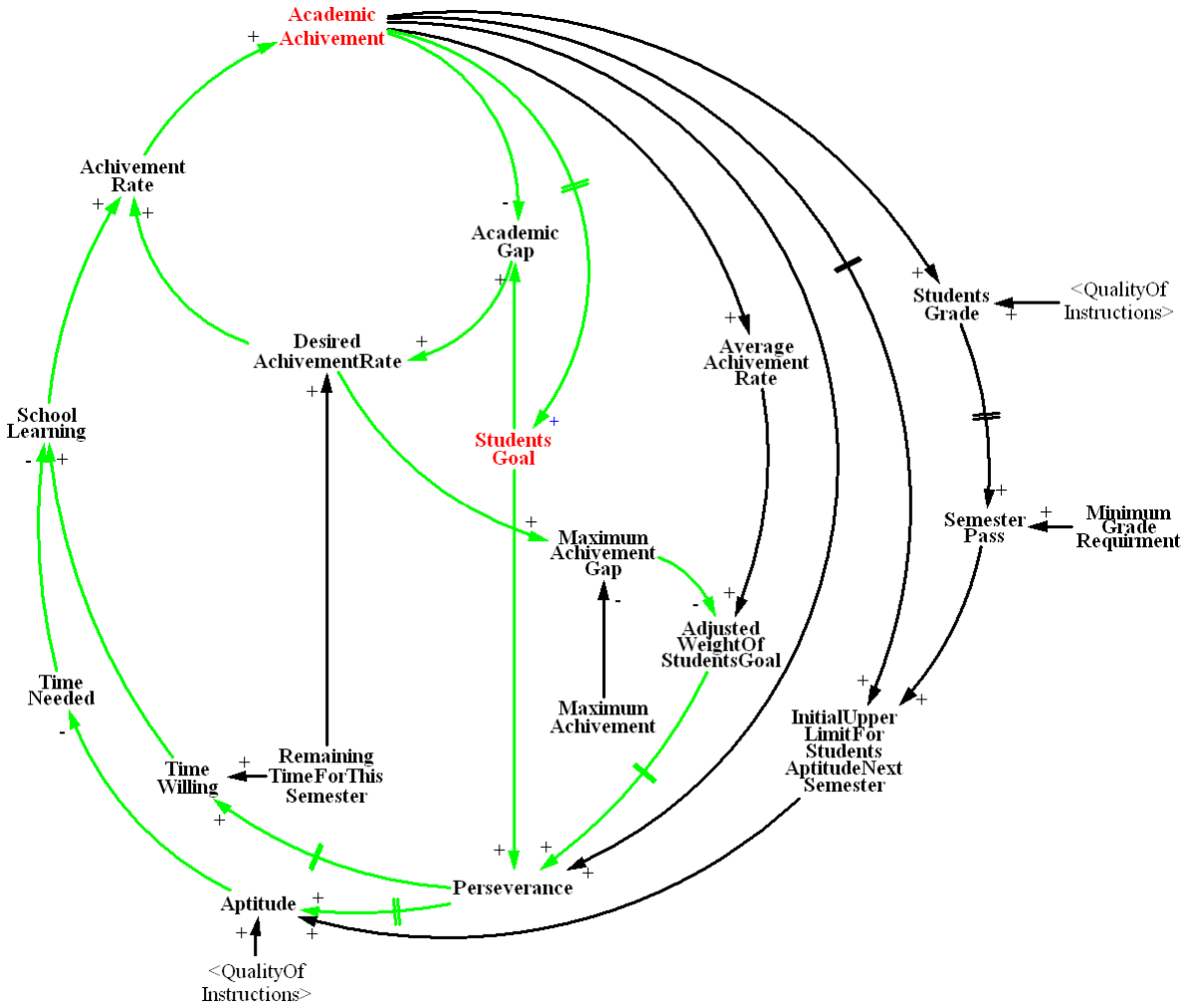

Figure 28 shows the feedback processes operating within the system for the model student with an implicit goal policy in play.

5.5.3.2 Loop 10

AcademicAchivement+StudentsGoal+AcademicGap+DesiredAchivementRate+AchivementRate

5.5.3.3 Loop 11

AcademicAchivement+StudentsGoal+Persaverace+TimeWilling+SchoolLearning+AchivementRate

5.5.3.4 Loop 12

AcademicAchivement+StudentsGoal+Persaverace+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

5.5.3.5 Loop 13

AcademicAchivement+StudentsGoal+AcademicGap+DesiredAchivementRate+MaximumAchivementGap+WeightOfStudentsGoal+Persaverace+TimeWilling+SchoolLearning+AchivementRate

5.5.3.6 Loop 14

AcademicAchivement+StudentsGoal+AcademicGap+DesiredAchivementRate+MaximumAchivementGap+WeightOfStudentsGoal+Perseverance+Aptitude+TimeNeeded+SchoolLearning+AchivementRate

The main distinguishing factor with these implicit goal loops is that the model students' goal for the next semester will be determined by his academic achievement from the previous semester. So if the model student does not achieve his goal, he will adjust it for the next semester by lowering his goal.

5.5.4 The adjusted weight loops

The *adjusted weight policy* (*AWP*) is a strategy that a model student can choose to implement if he wants to improve his performance. Then, instead of following the basic *loops 2* and *3*, the model student adjusts the weight on his goal with an additional delay.

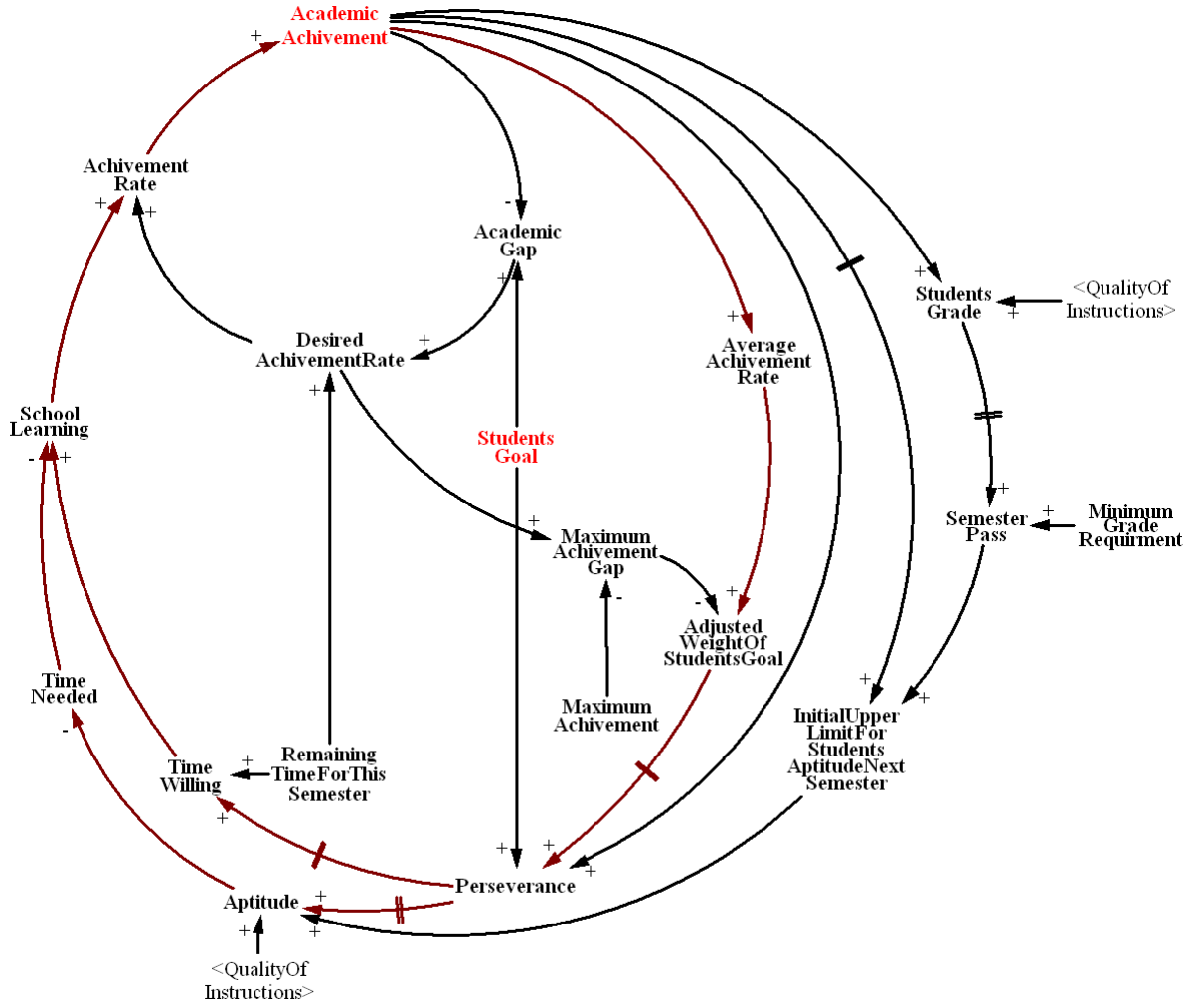

Figure 29 shows the feedback processes operating within the system for a model student with an adjusted weight policy in play.

5.5.4.1 Loop 15

AcademicAchivement+AverageAchivementRate+AdjustedWeight+Persaverace+TimeWilling +SchoolLearning+AchivementRate

5.5.4.2 Loop 16

AcademicAchivement+AverageAchivementRate+AdjustedWeight+Perseverance+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

Both of these feedback loops contribute to the model student's academic achievement by making him more perseverant.

5.5.5 The cheat loops

If the model student decides to implement a *cheating policy (CP)*, two additional feedback loops will be activated within the system:

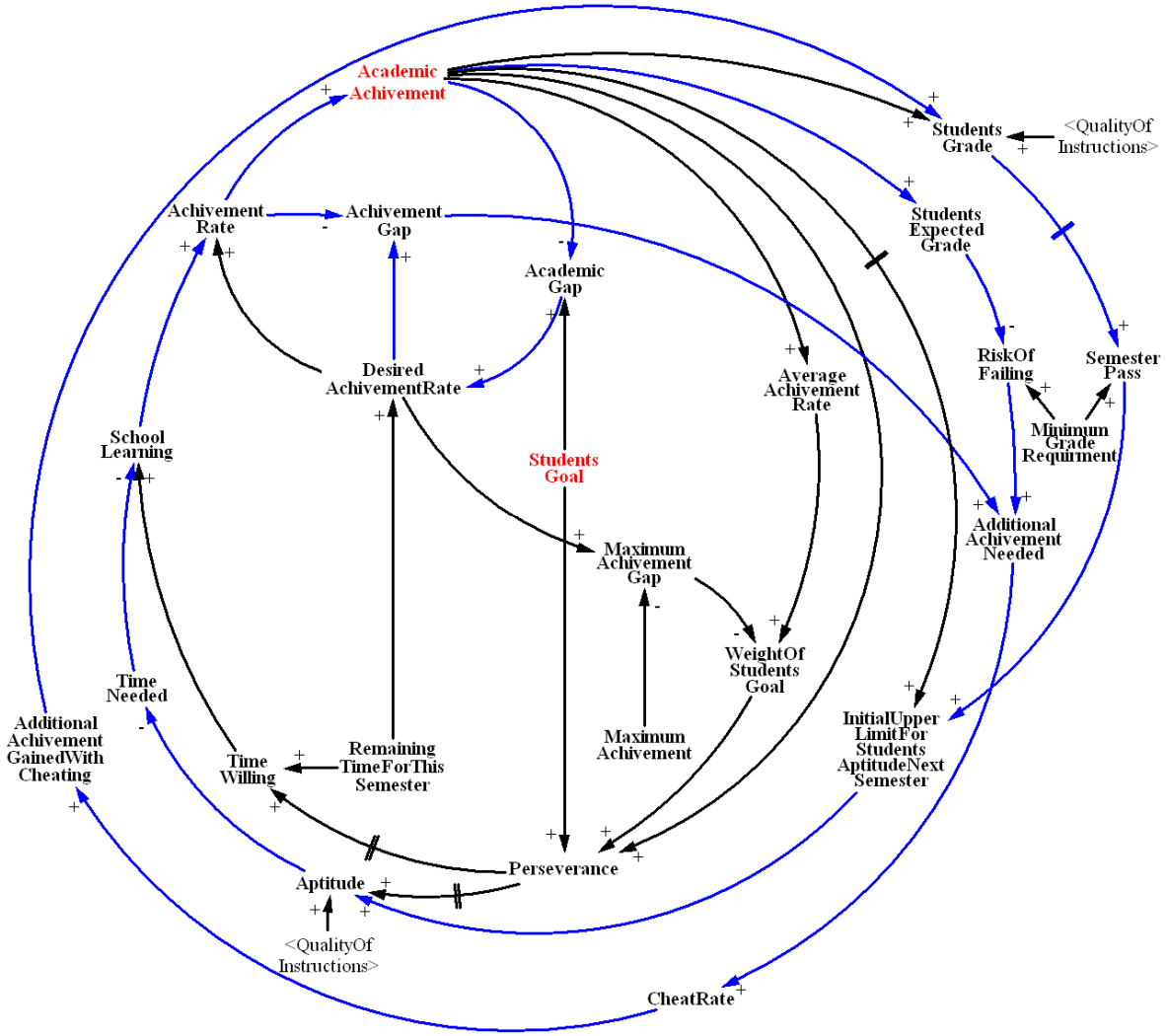

Figure 30 shows the feedback processes operating within the system for a model student with an active cheating policy.

5.5.5.1 Loop 17

AcademicAchivement+StudentsExpectedGrade-RiskOfFailing+AdditionalAchivementNeeded+CheatRate+AdditionalAchivementGainedWithCheating+StudentsGrade+SemesterPass+InitialUpperLimitForStudentsAptitudeNextSemester+Aptitude-TimeNeeded-SchoolLearning+AchivementRate

5.5.5.2 Loop18

AcademicAchivement-
AcademicGap+DesiredAchivementRate+AchivementGap+AdditionalAchivementNeeded+Ch
eatRate+AdditionalAchivementGainedWithCheating+StudentsGrade+SemesterPass+InitialU
pperLimitForStudentsAptitudeNextSemester+Aptitude-TimeNeeded-
SchoolLearning+AchivementRate

Both of these loops are balancing loops that aim at balancing the model students' risk of failing by adding something additional to the model students' grade.

6 Analysis

Cluster analysis offers a way of categorizing samples by identifying certain characteristics within a certain group (cluster) that are identical within the group but differ from all other groups (Scott and Knott, 1974).

In total, 384 simulation results were documented for the purpose of this project. Five independent variables (*InitialValueForStudentsAptitude, PerseveranceDelayTime, WeightDelayTime*, *MinimumGradeRequirement* and *StudentsGoal*) were tested in a matrix and the resulting grade, as well as the means by which the model student came by the grade, were documented.

The model was simulated over eight semesters of four months each, or a total of 32 months. Each simulation result represents one case for a model student. Each model student was given a corresponding numerical value from 2 – 384. Each run was documented and the results can be seen in the *Appendix*.

When the total sample of 384 was analyzed, 25% of the sample showed the same basic behavior.

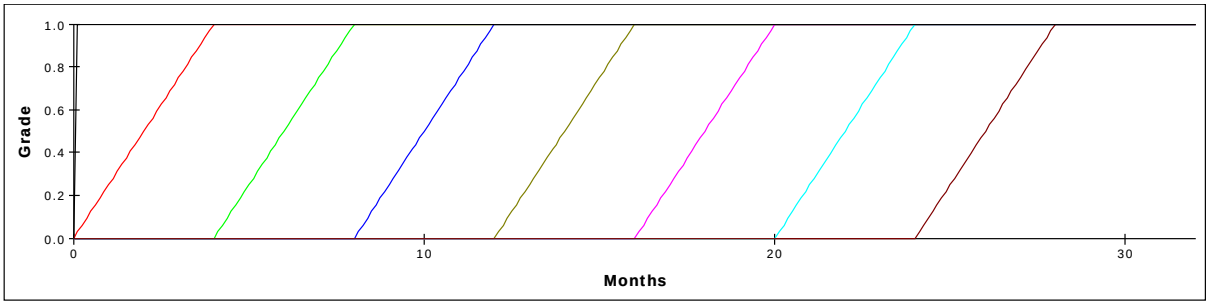

Figure 31 shows the behavior of Run145 with an implicit goal and an aptitude of 1.

Each line on the graph represents one semester for the model students' grade. The black line represents the model students' cumulative average grade. Initially the model students (just like any other students for that matter) has an average of zero because he has not achieved anything within the confines of the system yet. As soon as the simulation starts and the model student achieves something and the average can be known. That is why the black line rises so quickly whereas each semester the curve is much smoother.

Even with full aptitude, the model student is not able to score a perfect grade of one with an implicit goal. Instead, because of the delay when incorporating the implicit goal, the model student adjusts his goal by lowering it slightly after the third semester. Therefore the model student graduates with a 0.9998 average.

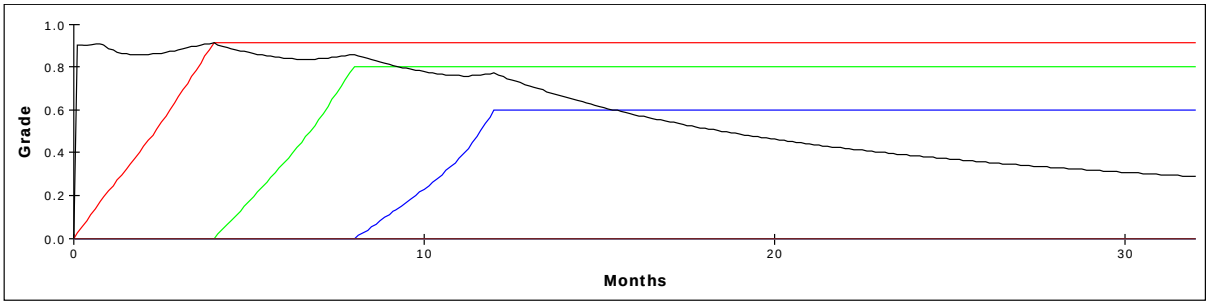

Figure 32 shows the behavior of Run146 with an implicit goal and an aptitude of 0.9. In this case the model students failed the third semester.

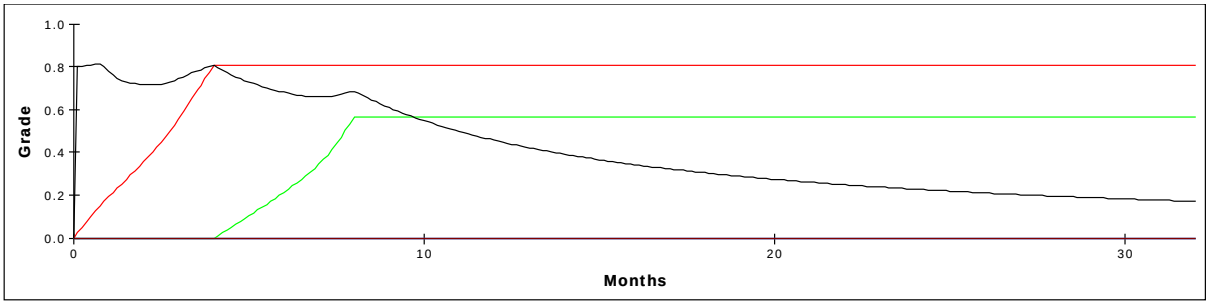

Figure 33 shows the behavior of Run147 with an implicit goal and an aptitude of 0.8. In this case the model students failed the second semester.

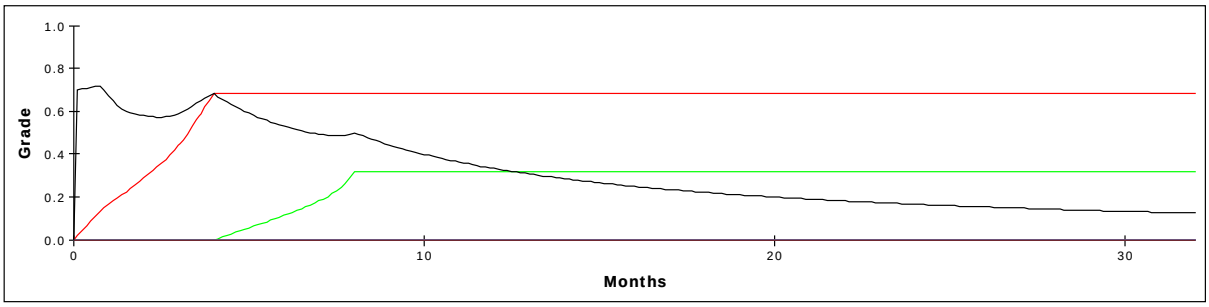

Figure 34 shows the behavior of Run148 with an implicit goal and an aptitude of 0.7. In this case the model students failed the second semester.

These four figures are representative for 25% of the sample. In all cases the model student lowered his goal each semester, resulting in semester fail. The five additional feedback loops (*loop 10 – loop 14* from *figure 28*) dominate the structure and eventually drive the system to the ground. Not even when both the *CP* and *AWP* were utilized, all model students with aptitude less than one failed. From this it is safe to conclude that the *IGP* will not work to the models students' advantage.

By removing these 96 cases, the total number of model students that fail, decreases from 102 students to 30 students. Also, the total number of cheats drops from 228 students to 156 students.

When the 96 implicit goal cases are excluded, *288* cases remain.[6] Of those cases, 54% cheated. Roughly 19% cheated only in one semester while the remaining 35% cheated in two or more semesters.

The total sample (N) can be clustered together in three groups according to the model students' goal; a constant goal of *1, 0.99* or *0.95.* [7]

	Goal = 1		Goal = 0.99		Goal = 0.95		**Average**	**Average**
	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails
Aptitude =1	0	0	0	0	62.5	9	20.8	3
Aptitude = 0.9	4.1	0	8.3	1	70.8	12	27.7	4.3
Aptitude = 0.8	62.5	2	66.6	4	91.6	15	73.6	7
Aptitude = 0.7	87.5	8	95.8	10	100	17	94.4	11.7
Average	38.5	2.5	42.7	3.8	81.2	13.3	54.1	6.5

Table 2 shows the results of the model simulations when the student's goal varies 1 to 0.95.

The simulation results show a clear correlation between the model students' goal and grade. As the model student lowers his goal, his grades go down and he fails more frequently. As the model student lowers his goal, he can find more use for alternative means of achievement and because of his unwillingness to resolve his studies with hard work and dedication, the model student decides to cheat in order to graduate.

The model is very sensitive to changes in the students' goal. It is enough to look at the relatively small change in goal from 0.99 to 0.95 to see the effects it has on cheating for a model student with an aptitude of 1. From zero to 62.5% is a big step in a range of 0.04. But, somewhere in that range there lies the value that can get the first model student with an aptitude of one to cheat.

For all the model students with a high goal (1 or 0.99), only students with low aptitude of 0.8 or 0.7, cheated. Here again lies another sensitive value within the structure of the model in the range of the *aptitude* between 0.8 and 0.9 that can make or break a model student as a cheat.

[6] The runs excluded are *Run145 – Run192* and *Run337 – 384*.

[7] For this table, 24 sample cases are available. E.g. there are 24 cases where a model student has *Aptitude* of 1 and a *Goal* of *1*. Then there are 24 other cases where a model student has *Aptitude* of 1 and *Goal* of 0.99. By comparing these values, the student's performance can be evaluated.

To analyze the sample further it is possible to cluster it in two groups of a 144 cases. One group has the normal *perseverance delay time* of 0.35 months. The other group has a delay time of 1 month. A student with a higher delay time can be viewed as more determined. He will endure more pressure before adjusting to the dynamics of the system.

	IPDT = 0.35 month		IPDT = 1 month		**Average**	**Average**
	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails
Aptitude =1	22,2	5	19,4	4	20,8	4,5
Aptitude = 0.9	33,3	7	25	5	29,2	6
Aptitude = 0.8	80,5	12	63,9	10	72,2	11
Aptitude = 0.7	97,2	20	91,7	15	94,5	17,5
Average	58,3	11,0	50,0	8,5	54,2	9,8

Table 3 shows the results of the model simulations when the initial perseverance delay time varies from 0.35 months to 1 month. For this table 24 cases are available for every calculation.

IPDT = *InitialPerseveranceDelayTime*.

These results clearly show that model students with a longer delay time performed much better. They got higher grades and cheated less.

Again if the sample clusters are three and the *students' minimum grade requirement* defines the groups, then model students with a high *minimum grade requirement* are more likely to cheat than others. This being the case, some students have more risk of failing the semester because of different minimum requirements. The students' minimum grade requirement is beyond the control of the model student and does not affect his grade directly. However, a student with a high *minimum grade requirement* would be expected to be diligent and willing to implement additional strategies to the most basic in order to advance his academic carrier.

	SMGR = 0.7		SMGR = 0.8		SMGR = 0.9		**Average**	**Average**
	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails
Aptitude =1	12,5	0	16,7	1	33,3	8	20,8	3
Aptitude = 0.9	16,7	1	25	3	45,8	10	29,2	4,7
Aptitude = 0.8	37,5	3	79,1	5	100	14	72,2	7,3
Aptitude = 0.7	83,3	7	100	10	100	19	94,4	12
Average	37,5	2,8	55,2	4,8	69,8	12,8	54,2	6,8

Table 4 shows the results of the model simulations when the model students' minimum grade requirement varies from 0.7 to 0.9. For this table 24 cases are available for every calculation.

SMGR = *StudentsMinimumGradeRequirement*.

When only model students with high goals (1 or 0.99) and a normal minimum grade requirement of 0.7 are examined together, 64 cases of model students still offer 25% cheats. Students with high aptitude (0.9 or 1) all got good grades and had no reason to cheat. Only students with low aptitude (0.7 or 0.8) cheated because at some point, those model students ran the risk of failing the semester if nothing additional would be done.

The simulation results confirm what would be expected in real life; as the minimum grade requirement goes up, the risk of failure goes up and students cheat more. This clearly shows that a student with a high minimum grade requirement has more reason to cheat than normal.

One strategy the model student can implement if he wants to improve his grade is adjusting the weight he puts on his goal. Then the model student starts every semester completely focused and motivated to reach his goal. Then feedback loops *15* and *16* from *figure 29* have been activated and contribute something additional to the 8 basic loops.

	WDT= 0 months		WDT = 0.5 month		WDT = 1 month		WDT = 2 months		**Average**	**Average**
	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails	% that cheated	Semester fails
Aptitude =1	33.3	3	27.8	2	11.1	2	11.1	2	20.8	2.3
Aptitude = 0.9	44.4	6	38.9	3	22.2	2	11.1	2	29.2	3.3
Aptitude = 0.8	88.8	10	88.9	7	66.7	3	38.9	2	70.8	5.5
Aptitude = 0.7	100	16	100	11	94.4	7	83.3	2	94.4	9
Averag	66.6	8.8	63.9	5.8	48.6	3.5	36.1	2.0	53.8	5.0

Table 5 shows the results of the different weight policies for the model student. For this table 18 cases are available for every calculation.

WDT = *WeightDelayTime*.

These two feedback loops have a very positive effect on the model students' grade. If the student has no weight policy in place he will start every semester just as motivated as he finished the previous one. If however, the student would use the semester break to regroup and get more focused, then the delay time for the student is extremely important. Model students with a high *WDT* can achieve more on their own by traditional means of hard work and dedication and therefore have less reason to cheat.

6.1 Testing the dynamic hypothesis

The *H0 hypothesis* claims that *all students can graduate*. The simulation results from *Run4* contradict that.

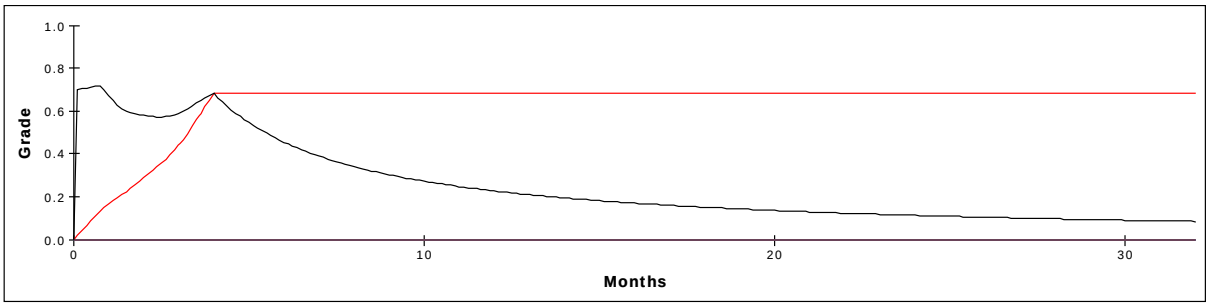

Figure 35 shows the behavior for Run4 where the model student started out with low aptitude (0.7) and only utilized the minimum basic structure from figure 27.

At the end of the first semester the model student in *Run4* only achieved 0.68. He did not meet the minimum grade requirement of 0.7 and failed the semester. Without any adjustments, this student would never get past the first semester. So the H0 has can be rejected. Students do in fact fail and not graduate.

Figure 36 on the other hand shows what can happen if the model student adds two more loops to his strategy, *loop 17* and *loop 18*. Now the student reaches the minimum grade requirement every semester and is able to graduate with the aid of cheating.

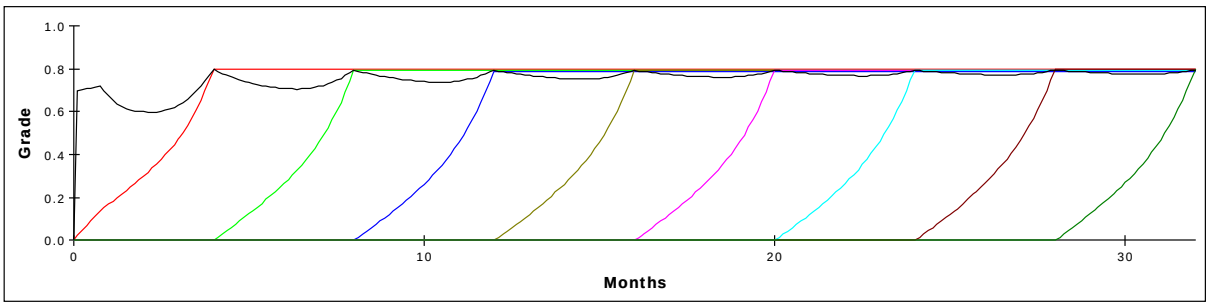

Figure 36 shows the development for the model student in Run4 where in addition to the basic 8 feedback loops operating from the basic structure in figure 27, two additional loops, loop 17 and loop 18 in figure 31 have been activated.

The additional achievement gained with cheating adds to the model students grade, making it possible for him graduate. Even though he is still putting in less than the minimum effort required, he manages to graduate with an average grade of 0.79. This shows that a student can prevent failing the semester and cheat in order to graduate.

There are in fact 18 different cases of model students where cheating played a determining role regarding graduation.[8] In all these 18 cases, the model student would have failed but, did in fact graduate because of cheating.

The characteristics of these 18 cases can be clustered in two; 9 cases have low aptitude (0.7) and12 cases have a low goal (0.95).[9]

These results support *the H1 hypothesis* that claims that s*tudents with low aptitude are more likely to cheat in order to graduate.* Students with low *aptitude* do in fact cheat more on average than students with high *aptitude*. This can be observed in *tables 2 - 5* where the average % of cheats for model students with an *aptitude* is 1 is around 20%. With an *aptitude* of 0.7, almost 95% of the model students cheated.

Finally, the *H2 hypothesis* claims, s*tudents with low aptitude can graduate without cheating.* Of the 72 model students with an *aptitude* of 0.7, only 5.5% managed to graduate without cheating. Of the 72 model students with an aptitude of 0.8, more than 27% graduated without cheating. This still confirms that students with low *aptitude* can in fact graduate without cheating. They just have to be willing to implement alternative strategies in order to do so.

[8] Run # 4, 8, 12, 52, 56, 60, 98, 102, 106, 111, 115, 119, 291, 295, 299, 304, 308, 312.
[9] Three cases have both low aptitude and a low goal.

7 Conclusion

The aim of this paper has been to emphasize the importance of graduation in every student's life. Generic feedback processes have been identified and their contribution to the model students' performance documented.

Two feedback loops are of special interest, *loop 17* and *loop 18*. By activating these loops, a student implements a cheating strategy and aims to graduate with the aid of cheating. These two loops balance out the students' risk of failing and can in fact save the students' academic carrier.[10]

The model in this paper is a composition of many things. At its core is Merton's theory on social deviance. The students grade is the culturally defined goal and the two rates, the *achievement rate* and the *cheat rate*, represents the *traditional means of hard work and dedication* and the *alternative means of cheating*. All are part of the same structure that determines the model students' behavior.

The results of the model simulations are consistent with literature from the likes of Bunn et al. (1992), Haines et al. (1986) and Singhal (1982): *students with low grades are more prone towards cheating than students with high grades*. In addition, the model shows that students with low grades cheat more because they are at more risk of failing.

However, the model also shows that not all hope is lost for students with low grades. Model student that initially starts out with full aptitude can in fact both cheat and fail. Also, a model student with low aptitude can graduate without cheating.

In addition to cheating there is another strategy available in order to graduate; aim high and focus on the goal. By keeping high standards of maximum achievement every semester, a model student can adjust the weight he puts on the goal by putting in more time. Instead of starting every semester exactly like he finished the last one, the student can start every semester fully motivated and willing to achieve more.

Two feedback loops make this possible for the model student, *loop 15* and *loop 16*. When compared with the basic *loop 2* and *loop3*, the only difference is the delay. The delays lie within the student and make him more willing to invest time of hard work and dedication in his studies.

By favoring one strategy over another, students can choose their own feedback loops to advance their academic carriers. No matter what the students' initial aptitude may be, with the right feedbacks working, it is possible to graduate with honors.

[10] If this were a moral study, this could most certainly be an issue, but since this is only a policy analysis of student strategies, this matter will be left open…

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9 Appendixes

9.1 Appendix 1

This appendix shows all the variable names from the model. The *unit* column show what units a variable has. If nothing is written next to the variable it has no units. The documentation has the initial value and equations for the variables.

Variable name	Unit	Definition
AcademicAchivement1		0
AcademicAchivement2		0
AcademicAchivement3		0
AcademicAchivement4		0
AcademicAchivement5		0
AcademicAchivement6		0
AcademicAchivement7		0
AcademicAchivement8		0
AcademicGap1		IF(StudentsGoal-AcademicAchivement1<=0,0,StudentsGoal-AcademicAchivement1)
AcademicGap2		IF(ActiveGoal2-AcademicAchivement2<=0,0,ActiveGoal2-AcademicAchivement2)
AcademicGap3		IF(ActiveGoal3-AcademicAchivement3<=0,0,ActiveGoal3-AcademicAchivement3)
AcademicGap4		IF(ActiveGoal4-AcademicAchivement4<=0,0,ActiveGoal4-AcademicAchivement4)
AcademicGap5		IF(ActiveGoal5-AcademicAchivement5<=0,0,ActiveGoal5-AcademicAchivement5)
AcademicGap6		IF(ActiveGoal6-AcademicAchivement6<=0,0,ActiveGoal6-AcademicAchivement6)
AcademicGap7		IF(ActiveGoal7-AcademicAchivement7<=0,0,ActiveGoal7-AcademicAchivement7)
AcademicGap8		IF(ActiveGoal8-AcademicAchivement8<=0,0,ActiveGoal8-AcademicAchivement8)
AchivementGap1	month^-1	DesiredAchivement1-AchivementRate1
AchivementGap2	month^-1	(DesiredAchivement2-AchivementRate2)*AchivementGapTimeAdjustment2
AchivementGap3	month^-1	(DesiredAchivement3-AchivementRate3)*AchivementGapTimeAdjustment3
AchivementGap4	month^-1	(DesiredAchivement4-AchivementRate4)*AchivementGapTimeAdjustment4
AchivementGap5	month^-1	(DesiredAchivement5-AchivementRate5)*AchivementGapTimeAdjustment5
AchivementGap6	month^-1	(DesiredAchivement6-AchivementRate6)*AchivementGapTimeAdjustment6
AchivementGap7	month^-1	(DesiredAchivement7-AchivementRate7)*AchivementGapTimeAdjustment7
AchivementGap8	month^-1	(DesiredAchivement8-AchivementRate8)*AchivementGapTimeAdjustment8
AchivementGapTimeAdjustment2		IF(UsedTime2/1<<month>>=0,0,1)
AchivementGapTimeAdjustment3		IF(UsedTime3/1<<month>>=0,0,1)
AchivementGapTimeAdjustment4		IF(UsedTime4/1<<month>>=0,0,1)
AchivementGapTimeAdjustment5		IF(UsedTime5/1<<month>>=0,0,1)
AchivementGapTimeAdjustment6		IF(UsedTime6/1<<month>>=0,0,1)
AchivementGapTimeAdjustment7		IF(UsedTime7/1<<month>>=0,0,1)
AchivementGapTimeAdjustment8		IF(UsedTime8/1<<month>>=0,0,1)
AchivementRate1	month^-1	MIN(ActiveAchivementRate1,DesiredAchivement1)
AchivementRate2	month^-1	MIN(ActiveAchivementRate2,DesiredAchivement2)
AchivementRate3	month^-1	MIN(ActiveAchivementRate3,DesiredAchivement3)
AchivementRate4	month^-1	MIN(ActiveAchivementRate4,DesiredAchivement4)

AchivementRate5	month^-1	MIN(ActiveAchivementRate5,DesiredAchivement5)
AchivementRate6	month^-1	MIN(ActiveAchivementRate6,DesiredAchivement6)
AchivementRate7	month^-1	MIN(ActiveAchivementRate7,DesiredAchivement7)
AchivementRate8	month^-1	MIN(ActiveAchivementRate8,DesiredAchivement8)
ActiveAchivementRate1	month^-1	MIN(DesiredAchivement1*SchoolLearning1,MaximumAchivementRate)
ActiveAchivementRate2	month^-1	MIN(DesiredAchivement2*SchoolLearning2,MaximumAchivementRate)
ActiveAchivementRate3	month^-1	MIN(DesiredAchivement3*SchoolLearning3,MaximumAchivementRate)
ActiveAchivementRate4	month^-1	MIN(DesiredAchivement4*SchoolLearning4,MaximumAchivementRate)
ActiveAchivementRate5	month^-1	MIN(DesiredAchivement5*SchoolLearning5,MaximumAchivementRate)
ActiveAchivementRate6	month^-1	MIN(DesiredAchivement6*SchoolLearning6,MaximumAchivementRate)
ActiveAchivementRate7	month^-1	MIN(DesiredAchivement7*SchoolLearning7,MaximumAchivementRate)
ActiveAchivementRate8	month^-1	MIN(DesiredAchivement8*SchoolLearning8,MaximumAchivementRate)
ActiveGoal2		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal1,MinimumGradeRequirement))
ActiveGoal3		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal2,MinimumGradeRequirement))
ActiveGoal4		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal3,MinimumGradeRequirement))
ActiveGoal5		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal4,MinimumGradeRequirement))
ActiveGoal6		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal5,MinimumGradeRequirement))
ActiveGoal7		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal6,MinimumGradeRequirement))
ActiveGoal8		IF(GoalPolicySwitch=0,StudentsGoal,MAX(ImplicitStudentGoal7,MinimumGradeRequirement))
ActiveGrade1		IF(CheatPolicySwitch=0,Grade1,ExpectedGradeWithCheating1)
ActiveGrade2		IF(CheatPolicySwitch=0,Grade2,ExpectedGradeWithCheating2)
ActiveGrade3		IF(CheatPolicySwitch=0,Grade3,ExpectedGradeWithCheating3)
ActiveGrade4		IF(CheatPolicySwitch=0,Grade4,ExpectedGradeWithCheating4)
ActiveGrade5		IF(CheatPolicySwitch=0,Grade5,ExpectedGradeWithCheating5)
ActiveGrade6		IF(CheatPolicySwitch=0,Grade6,ExpectedGradeWithCheating6)
ActiveGrade7		IF(CheatPolicySwitch=0,Grade7,ExpectedGradeWithCheating7)
ActiveWeight2		IF(WeightPolicySwitch=0,WeightOfStudentsGoal2,AdjustedWeight2)
ActiveWeight3		IF(WeightPolicySwitch=0,WeightOfStudentsGoal3,AdjustedWeight3)
ActiveWeight4		IF(WeightPolicySwitch=0,WeightOfStudentsGoal4,AdjustedWeight4)
ActiveWeight5		IF(WeightPolicySwitch=0,WeightOfStudentsGoal5,AdjustedWeight5)
ActiveWeight6		IF(WeightPolicySwitch=0,WeightOfStudentsGoal6,AdjustedWeight6)
ActiveWeight7		IF(WeightPolicySwitch=0,WeightOfStudentsGoal7,AdjustedWeight7)
ActiveWeight8		IF(WeightPolicySwitch=0,WeightOfStudentsGoal8,AdjustedWeight8)
AdditionalAchivementGainedWithCheating1		0
AdditionalAchivementGainedWithCheating2		0
AdditionalAchivementGainedWithCheating3		0

AdditionalAchivementGainedWithCheating4		0
AdditionalAchivementGainedWithCheating5		0
AdditionalAchivementGainedWithCheating6		0
AdditionalAchivementGainedWithCheating7		0
AdditionalAchivementGainedWithCheating8		0
AdditionalAchivementNeeded1		IF(CheatWhenInRiskOfFailing1>0,EffectOfAchivementGapOnAdditionalAchivement1,CheatWhenInRiskOfFailing1)
AdditionalAchivementNeeded2		IF(CheatWhenInRiskOfFailing2>0,EffectOfAchivementGapOnAdditionalAchivement2,CheatWhenInRiskOfFailing2)
AdditionalAchivementNeeded3		IF(CheatWhenInRiskOfFailing3>0,EffectOfAchivementGapOnAdditionalAchivement3,CheatWhenInRiskOfFailing3)
AdditionalAchivementNeeded4		IF(CheatWhenInRiskOfFailing4>0,EffectOfAchivementGapOnAdditionalAchivement4,CheatWhenInRiskOfFailing4)
AdditionalAchivementNeeded5		IF(CheatWhenInRiskOfFailing5>0,EffectOfAchivementGapOnAdditionalAchivement5,CheatWhenInRiskOfFailing5)
AdditionalAchivementNeeded6		IF(CheatWhenInRiskOfFailing6>0,EffectOfAchivementGapOnAdditionalAchivement6,CheatWhenInRiskOfFailing6)
AdditionalAchivementNeeded7		IF(CheatWhenInRiskOfFailing7>0,EffectOfAchivementGapOnAdditionalAchivement7,CheatWhenInRiskOfFailing7)
AdditionalAchivementNeeded8		IF(CheatWhenInRiskOfFailing8>0,EffectOfAchivementGapOnAdditionalAchivement8,CheatWhenInRiskOfFailing8)
AdjustedWeight2		DELAYINF(IF(WeightAdjustment2>WeightOfStudentsGoal2,WeightAdjustment2,WeightOfStudentsGoal2), WeightDelayTime,3)
AdjustedWeight3		DELAYINF(IF(WeightAdjustment3>WeightOfStudentsGoal3,WeightAdjustment3,WeightOfStudentsGoal3), WeightDelayTime,3)
AdjustedWeight4		DELAYINF(IF(WeightAdjustment4>WeightOfStudentsGoal4,WeightAdjustment4,WeightOfStudentsGoal4), WeightDelayTime,3)
AdjustedWeight5		DELAYINF(IF(WeightAdjustment5>WeightOfStudentsGoal5,WeightAdjustment5,WeightOfStudentsGoal5), WeightDelayTime,3)
AdjustedWeight6		DELAYINF(IF(WeightAdjustment6>WeightOfStudentsGoal6,WeightAdjustment6,WeightOfStudentsGoal6), WeightDelayTime,3)
AdjustedWeight7		DELAYINF(IF(WeightAdjustment7>WeightOfStudentsGoal7,WeightAdjustment7,WeightOfStudentsGoal7), WeightDelayTime,3)
AdjustedWeight8		DELAYINF(IF(WeightAdjustment8>WeightOfStudentsGoal8,WeightAdjustment8,WeightOfStudentsGoal8), WeightDelayTime,3)
Aptitude1		Perseverance1*InitialUpperLimitForStudentsAptitude*QualityOfInstructions

Aptitude2		Perseverance2*UpperLimitForStudentsAptitude2*QualityOfInstructions
Aptitude3		Perseverance3*UpperLimitForStudentsAptitude3*QualityOfInstructions
Aptitude4		Perseverance4*UpperLimitForStudentsAptitude4*QualityOfInstructions
Aptitude5		Perseverance5*UpperLimitForStudentsAptitude5*QualityOfInstructions
Aptitude6		Perseverance6*UpperLimitForStudentsAptitude6*QualityOfInstructions
Aptitude7		Perseverance7*UpperLimitForStudentsAptitude7*QualityOfInstructions
Aptitude8		Perseverance8*UpperLimitForStudentsAptitude8*QualityOfInstructions
AverageAchivementRate	month^-1	(AcademicAchivement1+AcademicAchivement2+AcademicAchivement3+AcademicAchivement4+AcademicAchivement5+AcademicAchivement6+AcademicAchivement7+AcademicAchivement8)/TotalTimeUsed
CheatPolicySwitch		1
CheatRate1	month^-1	ContributionFromAdditonalAchivement1/TimeToCheat
CheatRate2	month^-1	(ContributionFromAdditionalAchivement2/TimeToCheat)*SemesterPass1
CheatRate3	month^-1	(ContributionFromAdditionalAchivement3/TimeToCheat)*SemesterPass2
CheatRate4	month^-1	(ContributionFromAdditonalAchivement4/TimeToCheat)*SemesterPass3
CheatRate5	month^-1	(ContributionFromAdditonalAchivement5/TimeToCheat)*SemesterPass4
CheatRate6	month^-1	(ContributionFromAdditonalAchivement6/TimeToCheat)*SemesterPass5
CheatRate7	month^-1	(ContributionFromAdditonalAchivement7/TimeToCheat)*SemesterPass6
CheatRate8	month^-1	(ContributionFromAdditonalAchivement8/TimeToCheat)*SemesterPass7
CheatWhenInRiskOfFailing1		IF(ExpectedGrade1<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing2		IF(ExpectedGrade2<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing3		IF(ExpectedGrade3<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing4		IF(ExpectedGrade4<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing5		IF(ExpectedGrade5<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing6		IF(ExpectedGrade6<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing7		IF(ExpectedGrade7<MinimumGradeRequirement,1,0)
CheatWhenInRiskOfFailing8		IF(ExpectedGrade8<MinimumGradeRequirement,1,0)
ContributionFromAdditionalAchivement2		AdditionalAchivementNeeded2*WhenToAct2
ContributionFromAdditionalAchivement3		AdditionalAchivementNeeded3*WhenToAct3
ContributionFromAdditonalAchivement1		IF(WhenToAct1=1,AdditionalAchivementNeeded1,0)
ContributionFromAdditonalAchivement4		AdditionalAchivementNeeded4*WhenToAct4
ContributionFromAdditonalAchivement5		AdditionalAchivementNeeded5*WhenToAct5
ContributionFromAdditonalAchivement6		AdditionalAchivementNeeded6*WhenToAct6
ContributionFromAdditonalAchivement7		AdditionalAchivementNeeded7*WhenToAct7
ContributionFromAdditonalAchivement8		AdditionalAchivementNeeded8*WhenToAct8

CumulativeAvegarageGradeWithCheating		(ExpectedGradeWithCheating1+ExpectedGradeWithCheating2+ExpectedGradeWithCheating3+ExpectedGradeWithCheating4+ExpectedGradeWithCheating5+ExpectedGradeWithCheating6+ExpectedGradeWithCheating7+ExpectedGradeWithCheating8)/TotalSemesters
CumulativeAverageAcademicAchivement		(AcademicAchivement1+AcademicAchivement2+AcademicAchivement3+AcademicAchivement4+AcademicAchivement5+AcademicAchivement6+AcademicAchivement7+AcademicAchivement8)/TotalSemesters
DepletionRate1	month/month	IF(RemainingTimeForThisSemester1<=0<<month>>,0,1)
DepletionRate2	month/month	IF(RemainingTimeForThisSemester2<=0<<month>>,0,1)*SemesterStart2
DepletionRate3	month/month	IF(RemainingTimeForThisSemester3<=0<<month>>,0,1)*SemesterStart3
DepletionRate4	month/month	IF(RemainingTimeForThisSemester4<=0<<month>>,0,1)*SemesterStart4
DepletionRate5	month/month	IF(RemainingTimeForThisSemester5<=0<<month>>,0,1)*SemesterStart5
DepletionRate6	month/month	IF(RemainingTimeForThisSemester6<=0<<month>>,0,1)*SemesterStart6
DepletionRate7	month/month	IF(RemainingTimeForThisSemester7<=0<<month>>,0,1)*SemesterStart7
DepletionRate8	month/month	IF(RemainingTimeForThisSemester8<=0<<month>>,0,1)*SemesterStart8
DesiredAchivement1	month^-1	AcademicGap1/FinalTimeAdjustment1
DesiredAchivement2	month^-1	AcademicGap2/FinalTimeAdjustment2
DesiredAchivement3	month^-1	AcademicGap3/FinalTimeAdjustment3
DesiredAchivement4	month^-1	AcademicGap4/FinalTimeAdjustment4
DesiredAchivement5	month^-1	AcademicGap5/FinalTimeAdjustment5
DesiredAchivement6	month^-1	AcademicGap6/FinalTimeAdjustment6
DesiredAchivement7	month^-1	AcademicGap7/FinalTimeAdjustment7
DesiredAchivement8	month^-1	AcademicGap8/FinalTimeAdjustment8
EffectOfAchivementGapOnAdditionalAchivement1		GRAPH(AchivementGap1,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement2		GRAPH(AchivementGap2,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement3		GRAPH(AchivementGap3,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement4		GRAPH(AchivementGap4,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement5		GRAPH(AchivementGap5,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement6		GRAPH(AchivementGap6,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementGapOnAdditionalAchivement7		GRAPH(AchivementGap7,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})

EffectOfAchivementGapOnAdditionalAchivement8		GRAPH(AchivementGap8,0<<1/month>>,0.1<<1/month>>,{0,0,0.01,0.025,0.04,0.06,0.075,0.095,0.115,0.135,0.15//Min:0;Max:1//})
EffectOfAchivementOnWeight1		GRAPH(MaximumAchivementGap1,0<<1/month>>,0.25<<1/month>>,{1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight2		GRAPH(MaximumAchivementGap2,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight3		GRAPH(MaximumAchivementGap3,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight4		GRAPH(MaximumAchivementGap4,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight5		GRAPH(MaximumAchivementGap5,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight6		GRAPH(MaximumAchivementGap6,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight7		GRAPH(MaximumAchivementGap7,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfAchivementOnWeight8		GRAPH(MaximumAchivementGap8,-1<<1/month>>,0.25<<1/month>>,{1,1,1,1,1,0.9,0.8,0.2,0//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight1		GRAPH(InitialAchivementAdjustment,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight2		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight3		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight4		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight5		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight6		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight7		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
EffectOfPastPerformaceOnWeight8		GRAPH(AverageAchivementRate,0<<1/month>>,0.25<<1/month>>,{0,1//Min:0;Max:1//})
ExpectedGrade1		AcademicAchivement1+((AcademicAchivement1-ReferanceLevel1)/RefLevelFormationTime)*RemainingTimeForThisSemester1
ExpectedGrade2		AcademicAchivement2+((AcademicAchivement2-ReferanceLevel2)/RefLevelFormationTime)*RemainingTimeForThisSemester2
ExpectedGrade3		AcademicAchivement3+((AcademicAchivement3-ReferanceLevel3)/RefLevelFormationTime)*RemainingTimeForThisSemester3
ExpectedGrade4		AcademicAchivement4+((AcademicAchivement4-ReferanceLevel4)/RefLevelFormationTime)*RemainingTimeForThisSemester4
ExpectedGrade5		AcademicAchivement5+((AcademicAchivement5-ReferanceLevel5)/RefLevelFormationTime)*RemainingTimeForThisSemester5

ExpectedGrade6		AcademicAchivement6+((AcademicAchivement6-ReferanceLevel6)/RefLevelFormationTime)*RemainingTimeForThisSemester6
ExpectedGrade7		AcademicAchivement7+((AcademicAchivement7-ReferanceLevel7)/RefLevelFormationTime)*RemainingTimeForThisSemester7
ExpectedGrade8		AcademicAchivement8+((AcademicAchivement8-ReferanceLevel8)/RefLevelFormationTime)*RemainingTimeForThisSemester8
ExpectedGradeWithCheating1		AcademicAchivement1*QualityOfInstructions+AdditionalAchivementGainedWithCheating1
ExpectedGradeWithCheating2		AcademicAchivement2*QualityOfInstructions+AdditionalAchivementGainedWithCheating2
ExpectedGradeWithCheating3		AcademicAchivement3*QualityOfInstructions+AdditionalAchivementGainedWithCheating3
ExpectedGradeWithCheating4		AcademicAchivement4*QualityOfInstructions+AdditionalAchivementGainedWithCheating4
ExpectedGradeWithCheating5		AcademicAchivement5*QualityOfInstructions+AdditionalAchivementGainedWithCheating5
ExpectedGradeWithCheating6		AcademicAchivement6*QualityOfInstructions+AdditionalAchivementGainedWithCheating6
ExpectedGradeWithCheating7		AcademicAchivement7*QualityOfInstructions+AdditionalAchivementGainedWithCheating7
ExpectedGradeWithCheating8		AcademicAchivement8*QualityOfInstructions+AdditionalAchivementGainedWithCheating8
FinalLearningAdjustment1		IF(RemainingTimeForThisSemester1/1<<month>>>0,1,0)
FinalLearningAdjustment2		IF(RemainingTimeForThisSemester2/1<<month>>>0,1,0)
FinalLearningAdjustment3		IF(RemainingTimeForThisSemester3/1<<month>>>0,1,0)
FinalLearningAdjustment4		IF(RemainingTimeForThisSemester4/1<<month>>>0,1,0)
FinalLearningAdjustment5		IF(RemainingTimeForThisSemester5/1<<month>>>0,1,0)
FinalLearningAdjustment6		IF(RemainingTimeForThisSemester6/1<<month>>>0,1,0)
FinalLearningAdjustment7		IF(RemainingTimeForThisSemester7/1<<month>>>0,1,0)
FinalLearningAdjustment8		IF(RemainingTimeForThisSemester8/1<<month>>>0,1,0)
FinalTimeAdjustment1	month	IF(RemainingTimeForThisSemester1<=0<<month>>,1<<month>>,RemainingTimeForThisSemester1)
FinalTimeAdjustment2	month	IF(RemainingTimeForThisSemester2=0<<month>>,1<<month>>,RemainingTimeForThisSemester2)
FinalTimeAdjustment3	month	IF(RemainingTimeForThisSemester3<=0<<month>>,1<<month>>,RemainingTimeForThisSemester3)
FinalTimeAdjustment4	month	IF(RemainingTimeForThisSemester4<=0<<month>>,1<<month>>,RemainingTimeForThisSemester4)
FinalTimeAdjustment5	month	IF(RemainingTimeForThisSemester5<=0<<month>>,1<<month>>,RemainingTimeForThisSemester5)
FinalTimeAdjustment6	month	IF(RemainingTimeForThisSemester6<=0<<month>>,1<<month>>,RemainingTimeForThisSemester6)
FinalTimeAdjustment7	month	IF(RemainingTimeForThisSemester7<=0<<month>>,1<<month>>,RemainingTimeForThisSemester7)
FinalTimeAdjustment8	month	IF(RemainingTimeForThisSemester8<=0<<month>>,1<<month>>,RemainingTimeForThisSemester8)
GoalFromationTime	month	0.35<<month>>
GoalPolicySwitch		0
Grade1		AcademicAchivement1*QualityOfInstructions
Grade2		AcademicAchivement2*QualityOfInstructions
Grade3		AcademicAchivement3*QualityOfInstructions
Grade4		AcademicAchivement4*QualityOfInstructions

Grade5		AcademicAchivement5*QualityOfInstructions
Grade6		AcademicAchivement6*QualityOfInstructions
Grade7		AcademicAchivement7*QualityOfInstructions
Grade8		AcademicAchivement8*QualityOfInstructions
GradeGap1		IF(MinimumGradeRequirement-Grade1<0,0,MinimumGradeRequirement-Grade1)
GradeGap2		IF(MinimumGradeRequirement-Grade2<0,0,MinimumGradeRequirement-Grade2)
GradeGap3		IF(MinimumGradeRequirement-Grade3<0,0,MinimumGradeRequirement-Grade3)
GradeGap4		IF(MinimumGradeRequirement-Grade4<0,0,MinimumGradeRequirement-Grade4)
GradeGap5		IF(MinimumGradeRequirement-Grade5<0,0,MinimumGradeRequirement-Grade5)
GradeGap6		IF(MinimumGradeRequirement-Grade6<0,0,MinimumGradeRequirement-Grade6)
GradeGap7		IF(MinimumGradeRequirement-Grade7<0,0,MinimumGradeRequirement-Grade7)
GradeGap8		IF(MinimumGradeRequirement-Grade8<0,0,MinimumGradeRequirement-Grade8)
IdealGoal		1
ImplicitStudentGoal1		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade1,MinAchivableGoal1)),GoalFromationTime,1)
ImplicitStudentGoal2		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade2,MinAchivableGoal2)),GoalFromationTime,3)
ImplicitStudentGoal3		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade3,MinAchivableGoal3)),GoalFromationTime,3)
ImplicitStudentGoal4		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade4,MinAchivableGoal4)),GoalFromationTime,3)
ImplicitStudentGoal5		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade5,MinAchivableGoal5)),GoalFromationTime,3)
ImplicitStudentGoal6		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade6,MinAchivableGoal6)),GoalFromationTime,3)
ImplicitStudentGoal7		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade7,MinAchivableGoal7)),GoalFromationTime,3)
ImplicitStudentGoal8		DELAYINF(MIN(IdealGoal,MAX(ExpectedGrade8,MinAchivableGoal8)),GoalFromationTime,3)
InitialAchivementAdjustment	month^-1	IF(SemesterAverageAchivementRate1=0<<1/month>>,AchivementRate1,SemesterAverageAchivementRate1)
InitialLearningAdjustment2		IF(DepletionRate2=0,0,1)
InitialLearningAdjustment3		IF(DepletionRate3=0,0,1)
InitialLearningAdjustment4		IF(DepletionRate4=0,0,1)
InitialLearningAdjustment5		IF(DepletionRate5=0,0,1)
InitialLearningAdjustment6		IF(DepletionRate6=0,0,1)
InitialLearningAdjustment7		IF(DepletionRate7=0,0,1)
InitialLearningAdjustment8		IF(DepletionRate8=0,0,1)
InitialPersaveranceDelayTime	month	0.35<<month>>
InitialUpperLimitForStudentsAptitude		1
MaximumAchivementGap1	month^-1	DesiredAchivement1-MaximumAchivementRate
MaximumAchivementGap2	month^-1	DesiredAchivement2-MaximumAchivementRate
MaximumAchivementGap3	month^-1	DesiredAchivement3-MaximumAchivementRate
MaximumAchivementGap4	month^-1	DesiredAchivement4-MaximumAchivementRate

MaximumAchivementGap5	month^-1	DesiredAchivement5-MaximumAchivementRate
MaximumAchivementGap6	month^-1	DesiredAchivement6-MaximumAchivementRate
MaximumAchivementGap7	month^-1	DesiredAchivement7-MaximumAchivementRate
MaximumAchivementGap8	month^-1	DesiredAchivement8-MaximumAchivementRate
MaximumAchivementRate	month^-1	IdealGoal/MinimumTimeNeeded
MinAchivableGoal1		AcademicAchivement1+MinimumAchivementRate1*RemainingTimeForThisSemester1
MinAchivableGoal2		AcademicAchivement2+MinimumAchivementRate2*RemainingTimeForThisSemester2
MinAchivableGoal3		AcademicAchivement3+MinimumAchivementRate3*RemainingTimeForThisSemester3
MinAchivableGoal4		AcademicAchivement4+MinimumAchivementRate4*RemainingTimeForThisSemester4
MinAchivableGoal5		AcademicAchivement5+MinimumAchivementRate5*RemainingTimeForThisSemester5
MinAchivableGoal6		AcademicAchivement6+MinimumAchivementRate6*RemainingTimeForThisSemester6
MinAchivableGoal7		AcademicAchivement7+MinimumAchivementRate7*RemainingTimeForThisSemester7
MinAchivableGoal8		AcademicAchivement8+MinimumAchivementRate8*RemainingTimeForThisSemester8
MinimumAchivementRate1	month^-1	GradeGap1/FinalTimeAdjustment1
MinimumAchivementRate2	month^-1	GradeGap2/FinalTimeAdjustment2
MinimumAchivementRate3	month^-1	GradeGap3/FinalTimeAdjustment3
MinimumAchivementRate4	month^-1	GradeGap4/FinalTimeAdjustment4
MinimumAchivementRate5	month^-1	GradeGap5/FinalTimeAdjustment5
MinimumAchivementRate6	month^-1	GradeGap6/FinalTimeAdjustment6
MinimumAchivementRate7	month^-1	GradeGap7/FinalTimeAdjustment7
MinimumAchivementRate8	month^-1	GradeGap8/FinalTimeAdjustment8
MinimumGradeRequirement		0.7
MinimumTimeNeeded	month	4
Perseverance1		DELAYINF(StudentsGoal*WeightOfStudentsGoal1+(1-WeightOfStudentsGoal1)*AcademicAchivement1,InitialPersaveranceDelayTime,3,1)
Perseverance2		DELAYINF(ActiveGoal2*ActiveWeight2+(1-ActiveWeight2)*AcademicAchivement2,0.35<<month>>,3)
Perseverance3		DELAYINF(ActiveGoal3*ActiveWeight3+(1-ActiveWeight3)*AcademicAchivement3,0.35<<month>>,3)
Perseverance4		DELAYINF(ActiveGoal4*ActiveWeight4+(1-ActiveWeight4)*AcademicAchivement4,0.35<<month>>,3)
Perseverance5		DELAYINF(ActiveGoal5*ActiveWeight5+(1-ActiveWeight5)*AcademicAchivement5,0.35<<month>>,3)
Perseverance6		DELAYINF(ActiveGoal6*ActiveWeight6+(1-ActiveWeight6)*AcademicAchivement6,0.35<<month>>,3)
Perseverance7		DELAYINF(ActiveGoal7*ActiveWeight7+(1-ActiveWeight7)*AcademicAchivement7,0.35<<month>>,3)
Perseverance8		DELAYINF(ActiveGoal8*ActiveWeight8+(1-ActiveWeight8)*AcademicAchivement8,0.35<<month>>,3)
QualityOfInstructions		1
ReferanceLevel1		DELAYINF(AcademicAchivement1,RefLevelFormationTime,3)
ReferanceLevel2		DELAYINF(AcademicAchivement2,RefLevelFormationTime,3)
ReferanceLevel3		DELAYINF(AcademicAchivement3,RefLevelFormationTime,3)

ReferanceLevel4		DELAYINF(AcademicAchivement4,RefLevelFormationTime,3)
ReferanceLevel5		DELAYINF(AcademicAchivement5,RefLevelFormationTime,3)
ReferanceLevel6		DELAYINF(AcademicAchivement6,RefLevelFormationTime,3)
ReferanceLevel7		DELAYINF(AcademicAchivement7,RefLevelFormationTime,3)
ReferanceLevel8		DELAYINF(AcademicAchivement8,RefLevelFormationTime,3)
RefLevelFormationTime	month	1
RefWeight		1
RemainingTimeForThisSemester1	month	4
RemainingTimeForThisSemester2	month	4
RemainingTimeForThisSemester3	month	4
RemainingTimeForThisSemester4	month	4
RemainingTimeForThisSemester5	month	4
RemainingTimeForThisSemester6	month	4
RemainingTimeForThisSemester7	month	4
RemainingTimeForThisSemester8	month	4
SchoolLearning1		(TimeWillingToSpend1/TimeNeeded1)*FinalLearningAdjustment1
SchoolLearning2		(TimeWillingToSpend2/TimeNeeded2)*FinalLearningAdjustment2*InitialLearningAdjustment2
SchoolLearning3		(TimeWillingToSpend3/TimeNeeded3)*FinalLearningAdjustment3*InitialLearningAdjustment3
SchoolLearning4		(TimeWillingToSpend4/TimeNeeded4)*FinalLearningAdjustment4*InitialLearningAdjustment4
SchoolLearning5		(TimeWillingToSpend5/TimeNeeded5)*FinalLearningAdjustment5*InitialLearningAdjustment5
SchoolLearning6		(TimeWillingToSpend6/TimeNeeded6)*FinalLearningAdjustment6*InitialLearningAdjustment6
SchoolLearning7		(TimeWillingToSpend7/TimeNeeded7)*FinalLearningAdjustment7*InitialLearningAdjustment7
SchoolLearning8		(TimeWillingToSpend8/TimeNeeded8)*FinalLearningAdjustment8*InitialLearningAdjustment8
SemesterAverageAchivementRate1	month^-1	(AcademicAchivement1/UsedTimeThisSemester1)
SemesterAverageAchivementRate2	month^-1	AcademicAchivement2/UsedTimeThisSemester2
SemesterAverageAchivementRate3	month^-1	AcademicAchivement3/UsedTimeThisSemester3
SemesterAverageAchivementRate4	month^-1	AcademicAchivement4/UsedTimeThisSemester4
SemesterAverageAchivementRate5	month^-1	AcademicAchivement5/UsedTimeThisSemester5
SemesterAverageAchivementRate6	month^-1	AcademicAchivement6/UsedTimeThisSemester6
SemesterAverageAchivementRate7	month^-1	AcademicAchivement7/UsedTimeThisSemester7
SemesterAverageAchivementRate8	month^-1	AcademicAchivement8/UsedTimeThisSemester8
SemesterPass1		IF(ActiveGrade1<MinimumGradeRequirement,0,1)
SemesterPass2		IF(ActiveGrade2<MinimumGradeRequirement,0,1)
SemesterPass3		IF(ActiveGrade3<MinimumGradeRequirement,0,1)
SemesterPass4		IF(ActiveGrade4<MinimumGradeRequirement,0,1)
SemesterPass5		IF(ActiveGrade5<MinimumGradeRequirement,0,1)

SemesterPass6		IF(ActiveGrade6<MinimumGradeRequirement,0,1)
SemesterPass7		IF(ActiveGrade7<MinimumGradeRequirement,0,1)
Semesters		GRAPHLINAS(TIME,0<<@month>>,32<<month>>,{0,8//Min:0;Max:8//})
SemesterStart2		IF(RemainingTimeForThisSemester1/1<<month>>>0,0,1)*SemesterPass1
SemesterStart3		IF(RemainingTimeForThisSemester2/1<<month>>>0,0,1)*SemesterPass2
SemesterStart4		IF(RemainingTimeForThisSemester3/1<<month>>>0,0,1)*SemesterPass3
SemesterStart5		IF(RemainingTimeForThisSemester4/1<<month>>>0,0,1)*SemesterPass4
SemesterStart6		IF(RemainingTimeForThisSemester5/1<<month>>>0,0,1)*SemesterPass5
SemesterStart7		IF(RemainingTimeForThisSemester6/1<<month>>>0,0,1)*SemesterPass6
SemesterStart8		IF(RemainingTimeForThisSemester7/1<<month>>>0,0,1)*SemesterPass7
StudentsGoal		1
TimeNeeded1	month	MinimumTimeNeeded/Aptitude1
TimeNeeded2	month	MinimumTimeNeeded/Aptitude2
TimeNeeded3	month	MinimumTimeNeeded/Aptitude3
TimeNeeded4	month	MinimumTimeNeeded/Aptitude4
TimeNeeded5	month	MinimumTimeNeeded/Aptitude5
TimeNeeded6	month	MinimumTimeNeeded/Aptitude6
TimeNeeded7	month	MinimumTimeNeeded/Aptitude7
TimeNeeded8	month	MinimumTimeNeeded/Aptitude8
TimeRestriction2		IF(RemainingTimeForThisSemester2/1<<month>>=0,0,1)
TimeRestriction22		IF(RemainingTimeForThisSemester2/1<<month>>=4,0,1)
TimeRestriction3		IF(RemainingTimeForThisSemester3/1<<month>>=0,0,1)
TimeRestriction33		IF(RemainingTimeForThisSemester3/1<<month>>>=4,0,1)
TimeRestriction4		IF(RemainingTimeForThisSemester4/1<<month>>=0,0,1)
TimeRestriction44		IF(RemainingTimeForThisSemester4/1<<month>>>=4,0,1)
TimeRestriction5		IF(RemainingTimeForThisSemester5/1<<month>>=0,0,1)
TimeRestriction55		IF(RemainingTimeForThisSemester5/1<<month>>>16,0,1)
TimeRestriction6		IF(RemainingTimeForThisSemester6/1<<month>>=0,0,1)
TimeRestriction66		IF(RemainingTimeForThisSemester6/1<<month>>>=4,0,1)
TimeRestriction7		IF(RemainingTimeForThisSemester7/1<<month>>=0,0,1)
TimeRestriction77		IF(RemainingTimeForThisSemester7/1<<month>>>24,0,1)
TimeRestriction8		IF(RemainingTimeForThisSemester8/1<<month>>=0,0,1)
TimeRestriction88		IF(RemainingTimeForThisSemester8/1<<month>>>=4,0,1)
TimeToCheat	month	1
TimeUsed	month	0
TimeWillingToSpend1	month	(UsedTime1+RemainingTimeForThisSemester1)*Perseverance1

TimeWillingToSpend2	month	MIN(4<<month>>,(RemainingTimeForThisSemester2+UsedTime2*Perseverance2))
TimeWillingToSpend3	month	MIN(4<<month>>,(RemainingTimeForThisSemester3+UsedTime3*Perseverance3))
TimeWillingToSpend4	month	MIN(4<<month>>,(RemainingTimeForThisSemester4+UsedTime4*Perseverance4))
TimeWillingToSpend5	month	MIN(4<<month>>,(RemainingTimeForThisSemester5+UsedTime5*Perseverance5))
TimeWillingToSpend6	month	MIN(4<<month>>,(RemainingTimeForThisSemester6+UsedTime6*Perseverance6))
TimeWillingToSpend7	month	MIN(4<<month>>,(RemainingTimeForThisSemester7+UsedTime7*Perseverance7))
TimeWillingToSpend8	month	MIN(4<<month>>,(RemainingTimeForThisSemester8+UsedTime8*Perseverance8))
TotalDepletionRate	month/month	1
TotalSemesters		IF(Semesters=0,1,Semesters)
TotalTimeAvailable	month	32
TotalTimeUsed	month	IF(TimeUsed=0<<month>>,1<<month>>,TimeUsed)
UpperLimitForStudentsAptitude2		AcademicAchivement1*SemesterPass1
UpperLimitForStudentsAptitude3		AcademicAchivement2*SemesterPass2
UpperLimitForStudentsAptitude4		AcademicAchivement3*SemesterPass3
UpperLimitForStudentsAptitude5		AcademicAchivement4*SemesterPass4
UpperLimitForStudentsAptitude6		AcademicAchivement5*SemesterPass5
UpperLimitForStudentsAptitude7		AcademicAchivement6*SemesterPass6
UpperLimitForStudentsAptitude8		AcademicAchivement7*SemesterPass7
UsedTime1	month	0
UsedTime2	month	0
UsedTime3	month	0
UsedTime4	month	0
UsedTime5	month	0
UsedTime6	month	0
UsedTime7	month	0
UsedTime8	month	0
UsedTimeThisSemester1	month	IF(UsedTime1=0<<month>>,1<<month>>,UsedTime1)
UsedTimeThisSemester2	month	IF(UsedTime2>0<<month>>,UsedTime2,1<<month>>)
UsedTimeThisSemester3	month	IF(UsedTime3>0<<month>>,UsedTime3,1<<month>>)
UsedTimeThisSemester4	month	IF(UsedTime4>0<<month>>,UsedTime4,1<<month>>)
UsedTimeThisSemester5	month	IF(UsedTime5>0<<month>>,UsedTime5,1<<month>>)
UsedTimeThisSemester6	month	IF(UsedTime6>0<<month>>,UsedTime6,1<<month>>)
UsedTimeThisSemester7	month	IF(UsedTime7>0<<month>>,UsedTime7,1<<month>>)
UsedTimeThisSemester8	month	IF(UsedTime8>0<<month>>,UsedTime8,1<<month>>)
WeightAdjustment2		IF(SemesterAverageAchivementRate2*1<<month>>>0,0,1)
WeightAdjustment3		IF(SemesterAverageAchivementRate3*1<<month>>>0,0,1)

WeightAdjustment4		IF(SemesterAverageAchivementRate4*1<<month>>>0,0,1)
WeightAdjustment5		IF(SemesterAverageAchivementRate5*1<<month>>>0,0,1)
WeightAdjustment6		IF(SemesterAverageAchivementRate6*1<<month>>>0,0,1)
WeightAdjustment7		IF(SemesterAverageAchivementRate7*1<<month>>>0,0,1)
WeightAdjustment8		IF(SemesterAverageAchivementRate8*1<<month>>>0,0,1)
WeightDelayTime	month	0.5<<month>>
WeightOfStudentsGoal1		DELAYINF(EffectOfAchivementOnWeight1*RefWeight*EffectOfPastPerformaceOnWeight1,WeightDelayTime,3,1)
WeightOfStudentsGoal2		EffectOfAchivementOnWeight2*EffectOfPastPerformaceOnWeight2*RefWeight
WeightOfStudentsGoal3		EffectOfAchivementOnWeight3*EffectOfPastPerformaceOnWeight3*RefWeight
WeightOfStudentsGoal4		EffectOfAchivementOnWeight4*EffectOfPastPerformaceOnWeight4*RefWeight
WeightOfStudentsGoal5		EffectOfAchivementOnWeight5*EffectOfPastPerformaceOnWeight5*RefWeight
WeightOfStudentsGoal6		EffectOfAchivementOnWeight6*EffectOfPastPerformaceOnWeight6*RefWeight
WeightOfStudentsGoal7		EffectOfAchivementOnWeight7*EffectOfPastPerformaceOnWeight7*RefWeight
WeightOfStudentsGoal8		EffectOfAchivementOnWeight8*EffectOfPastPerformaceOnWeight8*RefWeight
WeightPolicySwitch		0
WhenToAct1		IF(RemainingTimeForThisSemester1/1<<month>>=0,0,1)
WhenToAct2		TimeRestriction2*TimeRestriction22
WhenToAct3		TimeRestriction3*TimeRestriction33
WhenToAct4		TimeRestriction4*TimeRestriction44
WhenToAct5		TimeRestriction5*TimeRestriction55
WhenToAct6		TimeRestriction6*TimeRestriction66
WhenToAct7		TimeRestriction7*TimeRestriction77
WhenToAct8		TimeRestriction8*TimeRestriction88

9.2 Appendix 2

This appendix shows the results from the model simulations. The first column has the name for the run. The next five columns show the independent variables tested with the model. First there is the difference in aptitude ranging from 0.7 to 1. Next is the students' goal. Then the *initial perseverance delay time* (IPDT). The fifth column has the *adjusted weight delay time* (AWDT) and finally the model *students' minimum grade requirement* (SMG).

The two final columns show the results from the model simulation on the two dependent variables. First there is the model students' grade and then the grade the model student got with cheating.

Simulation results

						Grade	Grade with cheating
Base Run	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.7	1	1
Run2	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,938986	0,938986
Run3	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,846011	0,846759
Run4	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,674469	0,794566
Run5	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.8	1	1
Run6	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,938986	0,938986
Run7	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,846011	0,873606
Run8	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,674469	0,794566
Run9	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.9	1	1
Run10	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,938986	0,938988
Run11	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,846011	0,891455
Run12	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,674469	0,794566
Run13	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	1	1
Run14	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,96015	0,96015
Run15	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,90467	0,905141
Run16	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,81985	0,838577
Run17	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	1	1
Run18	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,96015	0,96015
Run19	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,90467	0,908593
Run20	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,81985	0,855752
Run21	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	1	1
Run22	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,96015	0,96015
Run23	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,90467	0,921139
Run24	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,81985	0,877707
Run25	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.7	1	1
Run26	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,974537	0,974537
Run27	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,941516	0,941516
Run28	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,896569	0,899382
Run29	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.8	1	1
Run30	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,974537	0,974537
Run31	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,941516	0,94194
Run32	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,896569	0,908364
Run33	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.9	1	1
Run34	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,974537	0,974537
Run35	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,941516	0,947419
Run36	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,896569	0,917985
Run37	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.7	1	1
Run38	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,985561	0,985561
Run39	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,96802	0,96802
Run40	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,946077	0,946077
Run41	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.8	1	1
Run42	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,985561	0,985561
Run43	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,96802	0,96802

Simulation results

						Grade	Grade with cheating
Run44	Aptitude = 0.7	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,946077	0,948526
Run45	Aptitude =1	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.9	1	1
Run46	Aptitude = 0.9	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,985561	0,985561
Run47	Aptitude = 0.8	Goal = 1	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,96802	0,971961
Run49	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,898055	0,898055
Run50	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,898055	0,898055
Run51	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,794231	0,799855
Run52	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,591105	0,74188
Run53	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,96316	0,96316
Run54	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,898055	0,898055
Run55	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,794231	0,844669
Run56	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,591105	0,74188
Run57	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,96316	0,96316
Run58	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,898055	0,910919
Run59	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,794231	0,857146
Run60	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,591105	0,74188
Run61	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,970185	0,970185
Run62	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,928581	0,928581
Run63	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,868953	0,8702
Run64	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,77595	0,806089
Run65	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,970185	0,970185
Run66	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,928581	0,928581
Run67	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,868953	0,878475
Run68	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,77595	0,828536
Run69	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,970185	0,970185
Run70	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,928581	0,931656
Run71	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,868953	0,898054
Run72	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,77595	0,847973
Run73	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,974039	0,974039
Run74	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,947971	0,947971
Run75	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,913288	0,913288
Run76	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,865603	0,869867
Run77	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,974039	0,974039
Run78	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,947971	0,947971
Run79	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,913288	0,914118
Run80	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,865603	0,882404
Run81	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,974039	0,974039
Run82	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,947971	0,947971
Run83	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,913288	0,923219
Run84	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,865603	0,895739
Run85	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,978099	0,978099
Run86	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,96357	0,96357
Run87	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,945617	0,945617

Simulation results

						Grade	Grade with cheating
Run88	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,923127	0,923185
Run89	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,978099	0,978099
Run90	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,96357	0,96357
Run91	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,945617	0,945617
Run92	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,923127	0,93084
Run93	Aptitude =1	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,978099	0,978099
Run94	Aptitude = 0.9	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,96357	0,96357
Run95	Aptitude = 0.8	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,945617	0,949908
Run96	Aptitude = 0.7	Goal = 0.99	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,923127	0,934551
Run97	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,790025	0,796224
Run98	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,689809	0,765968
Run99	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,302579	0,367425
Run100	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,127313	0,168245
Run101	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,790025	0,796224
Run102	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,691232	0,784195
Run103	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,527686	0,688676
Run104	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,445597	0,631372
Run105	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,790025	0,839602
Run106	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,691232	0,784195
Run107	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,527686	0,688676
Run108	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,445597	0,631372
Run109	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,837311	0,837312
Run110	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,782984	0,787856
Run111	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,699192	0,779897
Run112	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,546958	0,698588
Run113	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,837311	0,839445
Run114	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,782984	0,835562
Run115	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,699192	0,789205
Run116	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,348145	0,440448
Run117	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,837311	0,868115
Run118	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,782984	0,835562
Run119	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,699192	0,789205
Run120	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,348145	0,440448
Run121	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,861761	0,861761
Run122	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,83035	0,83035
Run123	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,786795	0,790443
Run124	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,724561	0,765234
Run125	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,861761	0,861761
Run126	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,83035	0,832325
Run127	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,786795	0,831979
Run128	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,724561	0,801967
Run129	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,861761	0,881303
Run130	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,83035	0,864595

Simulation results

						Grade	Grade with cheating
Run131	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,786795	0,837781
Run132	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,724561	0,801967
Run133	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,88637	0,88637
Run134	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,870504	0,870504
Run135	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,850344	0,850344
Run136	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,824807	0,827846
Run137	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,88637	0,88637
Run138	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,870504	0,870504
Run139	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,850344	0,853739
Run140	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,824807	0,840895
Run141	Aptitude =1	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,88637	0,897263
Run142	Aptitude = 0.9	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,870504	0,886868
Run143	Aptitude = 0.8	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,850344	0,875077
Run144	Aptitude = 0.7	Goal = 0.95	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,824807	0,860146
Run145	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,999753	0,999753
Run146	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,598495	0,670867
Run147	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,564528	0,654407
Run148	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.7	0,299275	0,438938
Run149	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,999753	0,999753
Run150	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,598495	0,670867
Run151	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,564528	0,654407
Run152	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.8	0,316404	0,457431
Run153	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,999753	0,999753
Run154	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,598495	0,670867
Run155	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,564528	0,654407
Run156	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0	SMG = 0.9	0,316404	0,457431
Run157	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,999753	0,999753
Run158	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,417979	0,52481
Run159	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,601521	0,674369
Run160	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.7	0,376828	0,498425
Run161	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,999806	0,999806
Run162	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,350305	0,370706
Run163	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,176016	0,188894
Run164	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.8	0,1324	0,162084
Run165	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,999806	0,999806
Run166	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,350305	0,373285
Run167	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,176016	0,192952
Run168	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 0.5	SMG = 0.9	0,1324	0,162084
Run169	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,999825	0,999825
Run170	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,386045	0,402595
Run171	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,249875	0,273229
Run172	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.7	0,157783	0,17979
Run173	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,999825	0,999825

Simulation results

						Grade	Grade with cheating
Run174	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,386045	0,39952
Run175	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,249875	0,268034
Run176	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.8	0,157783	0,17979
Run177	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,999825	0,999825
Run178	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,386045	0,400959
Run179	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,249875	0,273229
Run180	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 1	SMG = 0.9	0,157783	0,17979
Run181	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,999825	0,999825
Run182	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,485583	0,497687
Run183	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,288211	0,29487
Run184	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.7	0,239606	0,257691
Run185	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,999825	0,999825
Run186	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,485583	0,500031
Run187	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,288211	0,297678
Run188	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.8	0,239606	0,26014
Run189	Aptitude =1	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,999825	0,999825
Run190	Aptitude = 0.9	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,485583	0,500031
Run191	Aptitude = 0.8	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,288211	0,301619
Run192	Aptitude = 0.7	Goal = Imp	IPDT = 0.35	AWDT = 2	SMG = 0.9	0,239606	0,26507
Run193	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.7	1	1
Run194	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.7	0,951277	0,951277
Run195	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.7	0,882991	0,882991
Run196	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.7	0,776643	0,789007
Run197	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.8	1	1
Run198	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.8	0,951277	0,951277
Run199	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.8	0,882991	0,883626
Run200	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.8	0,776643	0,843975
Run201	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.9	1	1
Run202	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.9	0,951277	0,951277
Run203	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.9	0,882991	0,908963
Run204	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0	SMG = 0.9	0,776643	0,851911
Run205	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.7	1	1
Run206	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,967964	0,967964
Run207	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,925921	0,925921
Run208	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,867607	0,871553
Run209	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.8	1	1
Run210	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,967964	0,967964
Run211	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,925921	0,926513
Run212	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,867607	0,882861
Run213	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.9	1	1
Run214	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,967964	0,967964
Run215	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,925921	0,935453
Run216	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,867607	0,899589

Simulation results

						Grade	Grade with cheating
Run217	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.7	1	1
Run218	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.7	0,977916	0,977916
Run219	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.7	0,949984	0,949984
Run220	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.7	0,913466	0,913466
Run221	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.8	1	1
Run222	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.8	0,977916	0,977916
Run223	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.8	0,949984	0,949984
Run224	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.8	0,913466	0,922453
Run225	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.9	1	1
Run226	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.9	0,977916	0,977916
Run227	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.9	0,949984	0,954772
Run228	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 1	SMG = 0.9	0,913466	0,92774
Run229	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.7	1	1
Run230	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.7	0,987058	0,987058
Run231	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.7	0,971511	0,971511
Run232	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.7	0,952333	0,952333
Run233	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.8	1	1
Run234	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.8	0,987058	0,987058
Run235	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.8	0,971511	0,971511
Run236	Aptitude = 0.7	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.8	0,952333	0,953114
Run237	Aptitude =1	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.9	1	1
Run238	Aptitude = 0.9	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.9	0,953114	0,953114
Run239	Aptitude = 0.8	Goal = 1	IPDT = 1	AWDT = 2	SMG = 0.9	0,971511	0,97477
Run241	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.7	0,966083	0,966083
Run242	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.7	0,915577	0,915577
Run243	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.7	0,842072	0,842072
Run244	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.7	0,724491	0,75835
Run245	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.8	0,966083	0,966083
Run246	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.8	0,915577	0,915577
Run247	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.8	0,842072	0,844354
Run248	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.8	0,724491	0,81926
Run249	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.9	0,966083	0,966083
Run250	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.9	0,915577	0,915577
Run251	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.9	0,842072	0,884844
Run252	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0	SMG = 0.9	0,724491	0,81926
Run253	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,97214	0,97214
Run254	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,93946	0,93946
Run255	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,895404	0,895404
Run256	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,833631	0,839473
Run257	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,97214	0,97214
Run258	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,93946	0,93946
Run259	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,895404	0,896493
Run260	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,833631	0,856047

Simulation results

						Grade	Grade with cheating
Run261	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,97214	0,97214
Run262	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,93946	0,93946
Run263	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,895404	0,909825
Run264	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,833631	0,881522
Run265	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.7	0,975125	0,975125
Run266	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.7	0,95288	0,95288
Run267	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.7	0,92392	0,92392
Run268	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.7	0,885807	0,887122
Run269	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.8	0,975125	0,975125
Run270	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.8	0,95288	0,95288
Run271	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.8	0,92392	0,924133
Run272	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.8	0,885807	0,895513
Run273	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.9	0,975125	0,975125
Run274	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.9	0,95288	0,95288
Run275	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.9	0,92392	0,931746
Run276	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 1	SMG = 0.9	0,885807	0,907283
Run277	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.7	0,978585	0,978585
Run278	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.7	0,965717	0,965717
Run279	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.7	0,949813	0,949813
Run280	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.7	0,930214	0,930214
Run281	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.8	0,978585	0,978585
Run282	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.8	0,965717	0,965717
Run283	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.8	0,949813	0,949813
Run284	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.8	0,930214	0,931652
Run285	Aptitude =1	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.9	0,978585	0,978585
Run286	Aptitude = 0.9	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.9	0,965717	0,965717
Run287	Aptitude = 0.8	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.9	0,949813	0,953306
Run288	Aptitude = 0.7	Goal = 0.99	IPDT = 1	AWDT = 2	SMG = 0.9	0,930214	0,939681
Run289	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.7	0,811663	0,814572
Run290	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.7	0,744594	0,778884
Run291	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.7	0,63742	0,742486
Run292	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.7	0,223856	0,273474
Run293	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.8	0,811663	0,84098
Run294	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.8	0,744594	0,810862
Run295	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.8	0,63742	0,753518
Run296	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.8	0,223856	0,273474
Run297	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.9	0,811663	0,851941
Run298	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.9	0,744594	0,814286
Run299	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.9	0,63742	0,753518
Run300	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0	SMG = 0.9	0,223856	0,273474
Run301	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,850307	0,850307
Run302	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,811246	0,812056
Run303	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,755918	0,767614

Simulation results

						Grade	Grade with cheating
Run304	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,672881	0,773105
Run305	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,850307	0,85111
Run306	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,811246	0,83291
Run307	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,755918	0,820201
Run308	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,672881	0,773105
Run309	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,850307	0,87556
Run310	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,811246	0,852321
Run311	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,755918	0,820201
Run312	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,672881	0,773105
Run313	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.7	0,868493	0,868493
Run314	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.7	0,843112	0,843112
Run315	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.7	0,809309	0,809309
Run316	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.7	0,762681	0,775672
Run317	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.8	0,868493	0,868493
Run318	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.8	0,843112	0,843633
Run319	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.8	0,809309	0,827181
Run320	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.8	0,762681	0,823718
Run321	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.9	0,868493	0,886143
Run322	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.9	0,843112	0,871241
Run323	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.9	0,809309	0,851571
Run324	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 1	SMG = 0.9	0,762681	0,823718
Run325	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.7	0,889207	0,889207
Run326	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.7	0,87554	0,87554
Run327	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.7	0,858278	0,858278
Run328	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.7	0,836455	0,837352
Run329	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.8	0,889207	0,889207
Run330	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.8	0,87554	0,87554
Run331	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.8	0,858278	0,858711
Run332	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.8	0,836455	0,845985
Run333	Aptitude =1	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.9	0,889207	0,899583
Run334	Aptitude = 0.9	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.9	0,87554	0,89003
Run335	Aptitude = 0.8	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.9	0,858278	0,87985
Run336	Aptitude = 0.7	Goal = 0.95	IPDT = 1	AWDT = 2	SMG = 0.9	0,836455	0,866847
Run337	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.7	0,999753	0,999753
Run338	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.7	0,356395	0,377023
Run339	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.7	0,231925	0,256385
Run340	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.7	0,147497	0,165841
Run341	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.8	0,999753	0,999753
Run342	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.8	0,356395	0,377023
Run343	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.8	0,231925	0,256977
Run344	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.8	0,147497	0,173518
Run345	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.9	0,999753	0,999753
Run346	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.9	0,356395	0,377023

Simulation results

						Grade	Grade with cheating
Run347	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.9	0,231925	0,256977
Run348	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0	SMG = 0.9	0,147497	0,173518
Run349	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,999806	0,999806
Run350	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,372539	0,385148
Run351	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,242287	0,262538
Run352	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.7	0,153357	0,169314
Run353	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,999806	0,999806
Run354	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,372539	0,389057
Run355	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,242287	0,263131
Run356	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.8	0,153357	0,176991
Run357	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,999806	0,999806
Run358	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,372539	0,390841
Run359	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,242287	0,268372
Run360	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 0.5	SMG = 0.9	0,153357	0,176991
Run361	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.7	0,999825	0,999825
Run362	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.7	0,400855	0,408515
Run363	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.7	0,266344	0,277228
Run364	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.7	0,170475	0,179706
Run365	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.8	0,999825	0,999825
Run366	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.8	0,400855	0,411758
Run367	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.8	0,266344	0,281412
Run368	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.8	0,170475	0,188518
Run369	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.9	0,999825	0,999825
Run370	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.9	0,400855	0,412855
Run371	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.9	0,266344	0,2862
Run372	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 1	SMG = 0.9	0,170475	0,188518
Run373	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.7	0,99985	0,99985
Run374	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.7	0,499909	0,50872
Run375	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.7	0,355342	0,37211
Run376	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.7	0,249254	0,26543
Run377	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.8	0,99985	0,99985
Run378	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.8	0,499909	0,512306
Run379	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.8	0,355342	0,37231
Run380	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.8	0,249254	0,266212
Run381	Aptitude =1	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.9	0,99985	0,99985
Run382	Aptitude = 0.9	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.9	0,499909	0,513752
Run383	Aptitude = 0.8	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.9	0,355342	0,377613
Run384	Aptitude = 0.7	Goal = Imp	IPDT = 1	AWDT = 2	SMG = 0.9	0,249254	0,271729