The Amsterdam Model of Study Careers
Integration of Human Capital Theory and Sociological Integration theory in explaining Study Careers in Higher Education

Uulkje de Jong
Cora-Yfke Sikkema
Jaap Dronkers

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1. Introduction

Research to educational careers of student in higher education in modern societies is mostly based on Tinto's influential theory, which describes the longitudinal process of educational careers in higher education. This model is quite complex and does not give a clear picture of the mechanisms behind the choices that students make. In order to try to open the black box more, Tinto's model will be integrated with some aspects of human capital theory, which strongly depends upon rational choice theory.

The research questions of this paper are:
1. Which factors influence the choices made by students during their educational careers in higher education?
2. Can these factors be explained better by a combination of Human capital theory and the integration theory of Tinto?

In the second of this paper the theoretical background will be described, followed by a description of the longitudinal data in the third section. The fourth section shows the outcomes of the analyses. Finally, the fifth section describes the conclusions and discussion.

2. Theory

The problem described in this paper concerns the choices made by students in Dutch higher education during their educational career.
In order to answer the research questions of this paper, it is important to find out why persons decide to enter higher education and why they make certain choices during their educational careers. These decisions are individual choices. Therefore a theory is needed which can explain different study choices at the individual level. It is also important that this theory includes influences of a higher, contextual level. The institutional environment, for example, influences the decision-making of students.
In sum, a model is needed which can explain decisions on the individual level and which also pays attention to effects of the environment on those decisions.

2.1 A combination of Tinto's model and Human Capital Theory

Our model (De Jong et al, 1997) combines insights of Tinto's theory (Tinto 1975, 1987) with human capital theory.

[1] All authors work on the SCO-Kohnstamm Institute of the University of Amsterdam. Address: Wibautstraat 4, 1091 GM Amsterdam, the Netherlands. E-mail of U. de Jong: uulkje@sco.educ.uva.nl. E-mail, of C. Sikkema cryfke@sco.educ.uva.nl and of J. Dronkers jaapd@sco.educ.uva.nl.

2.1.1. Tinto's theory

An early application of Tinto's model in the Dutch research of educational careers in higher education is Dronkers (1976, 1982). Tinto describes the longitudinal process of educational careers of students in higher education. His interactional theory is based on Van Gennep's 'rites of passage' and on Durkheim's theory about suicide. These two theories inspired Tinto to focus on three important aspects:
1. an educational career in higher education is a longitudinal process of failure and success
2. the structure of the institute of higher education influences students in their decision making
3. social and intellectual integration of students in the new system stimulate students during their educational career.

Tinto states that in order to explain drop-out processes it is important to distinguish individual factors from institutional factors. Educational careers are individual processes but depend, to a certain degree, on the institutional environment. Therefore Tinto distinguishes individual roots of student departure (intention and commitment) from interactional roots of institutional departure (adjustment, difficulty, incongruence and isolation). Intention and commitment refer to *"important personal dispositions with which individuals enter institutions of higher education. These not only help set the boundaries of individual attainment but also serve to colour the character of individual experiences within the institution following entry"(Tinto, 1987: 39).*

The four forms on the institutional level *"describe an important interactional outcome arising from individual experiences within the institution"*, but also *"mirror the attributes, skills, and dispositions of individuals prior to entry and the effect of external forces on individual participation in college" (ibid.).*

These six factors are worked out in his theory (see figure 1).

--insert figure 1 here--

Students enter higher education with certain social and educational backgrounds. Therefore, Tinto's theory starts with background characteristics of aspirant students, like age, gender and socio-economic status. Secondly, he pays attention to the educational results of students before they enter higher education. These aspects are assumed to influence the intentions of students when they enter higher education. Students enter higher education with certain goals and commitments in mind. Tinto distinguishes two kinds of commitments, namely goal commitment and institutional commitment. The first refers to the extent to which students want to reach their goals (to get a degree); the latter refers to the extent to which students want to reach their goals at a particular institution.

After entering higher education students start the interaction with their new environment: new rules which have to be internalised. This process is called the integration process in Tinto's model. Most important, students have to meet the academic standards of the courses and to pass through exams. This is called the academic integration. The second kind of integration, social integration, refers to social contacts of the individual with other students and teacher staff. The outcome of integration processes influences the redefinition of goals and commitments. Students examine their own development in the new system and conclude whether to continue the courses or to drop out.

Goal commitment and institutional commitment of the individual take central places in Tinto's theory. They influence the way students will integrate in their new environment, and integration in turn defines the (changed) goals.

In Tinto's model, the individual process is stressed, but attention is also paid to the interaction process of the individual with the institutional environment. When a students fails to integrate in the new system, it may be caused both by the individual and the institution.

Some critical remarks have to be made here. First of all his model focuses on traditional students, which are young, full-time students who live on campus (Bean and Metzner, 1985). According to Pascarella, more attention needs to be paid to informal contacts between students and teacher staff (Pascarella,

1980). The theory does not work out very well why certain choices are made at a certain moment. Another critical note is that Tinto has described his model, but he did not explicate how to measure terms like integration and goal commitment. The link to the empirical analysis is weak. His theory does stress terms like goals and commitments. Therefore, we turn to economic theories on educational choices to help enrich Tinto's sociological theory.

2.1.2. Human capital theory

Two economic theories are mentioned here. First the pure investment model, which is based on human capital theory. Secondly the pure consumer model, which is based on the economic price theory. Integration of the consumer model and human capital theory showed better results than each theory seperately (Kodde & Ritzen (1984).
Human capital theory assumes that education is an investment in human capital (Mincer, 1974; Becker, 1975). During an educational career costs are made which will be earned back later via higher wages. The higher the costs of education are, the lower the chance that an individual decides to start a study. Increasing benefits, on the other hand, lead to higher chances that individuals start studying. The theory focuses on pecuniary costs and benefits, like tuition fees, forgone earnings and future earnings. Non-financial costs and benefits, like status, getting a nice job and financial independency also need attention though. Secondly, it has to be noted that college days are good times in which students have fun (Blaug, 1976). Kodde (1985) did not only look at forgone and future earnings, but also examined the effect of grade point average at secondary education. By including grade point average he took into account that future wages are only earned when a person has graduated. The chance to graduate increases when grade point average increases. Recent studies show that in the Netherlands forgone earnings do not influence the decision as the human capital theory expects (de Jong et al, 1992).
The second economic model is the pure consumption model (Kodde & Ritzen, 1984). Education, like every other product, can be bought by a consumer. The price of the product and the income of the consumer are important factors in the decision to buy the product or not. Therefore this approach pays attention to the educational and income level of parents as indicators of the income of the consumer.

In this paper we focus on the decision process following entry. Oosterbeek (1992) uses human capital theory to explain why students drop out. Human capital theory denies that aspirant students are not perfectly certain about their choices. Sometimes uncertainty about future incomes is mentioned. Oosterbeek assumes that students can not predict whether they will graduate or not, but they can *"attach a probability to the event that they will graduate. The expected returns to education then become a function of the product of the probability to graduate and the bonus" (1992: 56).* This subjective probability depends on the estimation of one's own capacities. During their study students interact with their new environment and reconsider their prior beliefs. In order to be able to continue their study students have to work. Oosterbeek pays attention to the effect of effort on the expected utility level of studying. He distinguishes a negative direct effect from a indirect positive effect. The direct effect is supposed to be negative because students prefer more leisure to less. On the other hand students want to graduate. More effort increase their subjective probability to graduate, which increases their chance to graduate. Students have to find an optimal point between these two forces.
Oosterbeek's analyses shows that the student's subjective probability to graduate has a negative influence on the decision to dropout. His research also shows that financial variables do not have important effects on continuance of studying. This means that human capital theory is falsified. However, other studies do confirm human capital theory, but most of these studies examine realized earnings. *"If the human capital theory claims to say something about individual schooling decisions it is expectations that matter, not realizations" (ibid: 82).*

These findings suggest that human capital theory is rather too naive to describe the real processes that occur during educational careers. The theory does not take into account that individuals are restricted in their observations, since they cannot see all possible alternatives and outcomes (Kodde & Ritzen, 1984; Lindenberg, 1990). Secondly, some outcomes may be uncertain, even if all available information is at hand. For example, it is not sure whether a student will find a job after graduation. Another weakness in human capital theory is the assumption that individuals decide only on rational beliefs, while moral and affective motivations may also play a role (Turkenburg, 1995, 1996). A fourth point is that human capital theory does not say anything about the tendency of people to avoid risk. In order to avoid risk, people may choose alternatives that are not the optimal rational ones (Elster, 1986).
Some aspects of the theory are useful though. Bounded rationality theory combines insights of sociological and economic theories (Lindenberg, 1990). The paradigm of the wanting and choice making person is integrated in a theory which stresses the deterministic influence of the social structure on human behaviour.
Sociological theories describe the influence of social norms on human behaviour. The problem with pure sociological theories is that they are static and ignore the freedom of the individual's own goals. Therefore the choice aspect of the economic theories are included in bounded rational choice theory.
Bounded rationality theory states that people are restricted in their decision making. They perceive situations in a subjective way. Cognitive restrictions bind people to focus on one main aspect, or goal, which is called the frame. This focus on one main aspect selects alternatives and their possible outcomes, and selects the situation with it. The situational goal orders all situational outcomes in terms of the extent to which they can reach the goal. Each alternative is given a certain chance and each outcome is given an expected value. In fact, Oosterbeek introduced a possible framing effect by adding the subjective probability in his model. Therefore, the outcome is restricted by the subjective estimation of initial capacities.
The sociological theories are hidden in the term 'frame'. The frame is the subjective perceptual boundary of the situation in which social norms play a role. By combining the influence of the social environment with the possibility of individuals to choose the alternative they want within their own restrictions, bounded rationality theory gives a better picture of processes on the individual level.

2.2. The Amsterdam model

The Amsterdam model combines these insights of human capital theory with Tinto's theory. Tinto's theory does include the framing idea of bounded rationality theory, because it controls for educational and socio-economic backgrounds. Tinto does not explain why and in what way these backgrounds influence choices made by students during their educational careers. De Jong et al (1997) concluded that Tinto's theory misses some aspects, which are pointed out by bounded rationality theory. Tinto does not pay attention to the rating of alternatives and the chances of success by each alternative. Therefore De Jong et al (1997) added several factors to the Tinto theory, that capture these aspects. They distinguish several aspects in the 'intentions and commitments' block of Tinto's theory. These are the following:
1. general goals: the expected outcomes of a study (intrinsic goals and extrinsic goals).
2. the valuation of the chosen alternative (the extent to which the student is motivated in the chosen study).
3. operational goals: the intention to get a degree
4. frame of outcomes: the estimation of the chance to get a degree and the estimated time needed for graduation
5. commitment: the actual behaviour of the student, her investment in the study.
The Amsterdam model assumes, like bounded rationality theory, that within a given context individuals understand the rules of the social game such that they can predict, to some extent, the outcome to

alternative courses of action. Since pecuniary variables did not effect the continuance of education these variables are not included in the model.[2]

Figure 2 shows the Amsterdam model, based on Tinto's theory and human capital theory. Block 1 consists of gender, socio-economic background (educational and income level of parents) and educational background (number of non promotion, grade point average secondary education and academic track at secondary education).

The second block contains only one variable: age at start of entry at higher education, which gives insight in the amount of delay due to non promotion at secondary education, or due to a different (and longer) track the students have followed before they started this study, or due to a period in which they have not studied (block II).

Blocks III and IV are operationalisations of goals and intentions. First two types of motivation are distinguished (extrinsic and intrinsic), followed by the saliency of choice at start. Types of motivation say something about goals of students who are going to study, while saliency of choice refers to the valuation of the chosen alternative.

Motivation, which can be seen as a general goal of students, is followed by two types of intentions (block V): intention success and intention success in one year. These are operational goals of students.

At start of the study, students estimate their chance of success (block VI). The estimation depends on the amount of the motivation to reach the goal, the estimated difficulty and the estimation of own capacities. Students will try to weight these factor rationally.

The estimated duration of graduation depends on the estimated difficulty, the culture at the institution, and the study investment of the student. We expect that the estimated duration (block VII) depends on intentions, capacities and the study environment.

Once students have started their study, we asked how many hours they spend studying. It indicates whether students actually behave the way they intended to do, whether they commit themselves to their study. After one year, students are asked to what extent their behaviour was focused on finishing their study as fast as possible and whether they were not postponing their behaviour. This investment scale is also an indicator of commitment (Block VIII).

Academic and social integration in the new environment is not always an easy process. In the Netherlands the propaedeutic year (first year) has a selective function. In order to measure the amount of integration two scales are developed (block IX). One scale gives an indication whether the students feels home after one year (evaluation of choice). The second scale measures the mismatch between the study with the capacities and initial educational experiences of students (academic mismatch).

The educational environment may also influence drop-out processes (block X). Students who evaluate the attended programmes as badly organized or who experience high pressure of the study program, may change their minds and reformulate their goals. In this paper we do not analyze the influence of courses on dropping-out, but only the perception of students of the study environment.

All described factors can influence the success in the first year to get the propaedeutic diploma (block XI).

In 1993, students were asked again how many hours they spend studying. This time a distinction is made between hours they went to classes and hours they studied at home (block XII). Students were also asked how motivated they are to continue their study in 1993 (block XIII). Finally students were asked in 1993 how much they invest in their study.

The model finishes with the dependent variable, which is the academic progress after 4 years (block XIV).

The Amsterdam model illustrates the differences between human capital theory and Tinto's theory.

[2] Information about (expected) forgone and future earnings is known, but almost 30% of the students did not know the height of these earnings.

Blocks I - V and VIII - XIV are operationalisations of Tinto's model. The inclusion of block VI and VII express the ideas of human capital theory. Both blocks give an indication of the reason why drop-out might rationally be a better alternative than continuing a study. The assumption of human capital theory that every person has the same information about alternatives and their outcomes is compensated by the bounded effect of socio-economic and educational backgrounds of students (blocks I and II).
Another difference between human capital theory and Tinto's theory is the influence of restrictions on educational careers. Human capital theory does pay attention to income and educational levels of parents and initial capacities of aspirant students, but assume that these variables have direct effects on academic progress. Tinto assumes that the influence of socio-economic and educational backgrounds work via intentions and commitments. The Amsterdam model has defined more specifically what kind of motivations and goals can be distinguished. This specification can explain better how background characteristics influence the educational progress.
Blocks VIII to XIII also restrict the outcomes of academic progress. Like in Tinto's theory, attention is paid to academic and social integration, which in their turn influence intentions and commitments. One aspect of the educational career is stressed more explicitly in the Amsterdam model: the investment of students and the amount of hours they spend into their study. Students may be very motivated to graduate, but have to work to reach this goal. Tinto's theory does not explicate this aspect very well, contrary to Oosterbeek who describes that student have to find the optimal amount of effort to both have enough leisure time and be able to pass through the exams.

--- insert Figure 2 here----

In the next section the data will be described, followed by the analyses in order to test the Amsterdam model.

2.3 Hypotheses

The discussion of the testing of the model will be concentrated on some basic hypotheses, which can be derived from our theoretical framework shown in figure 2:

1 Pre-university characteristics can effect variables of block II (age at start) to block VIII (commitments). After the commitments of students in the first year (block VIII), students backgrounds have no direct influence any more on the academic career.
2 General goals and saliency of choice effect operational goals
3 Operational goals have positive effects on academic integration and - progress
4 Framing of outcomes have positive effects on academic integration and - progress
5 Commitments have positive effects on academic integration and - progress
6 Academic integration has positive effects on commitments at t_3, saliency at t_3 and academic progress

In Scheme 1 we show the relationship of the hypotheses with both human capital and integration theory. One sees, the model we want to test is an integration of both human capital - and integration theory.

Scheme 1: Relationship between hypotheses and theory

hypotheses	Human capital theory (extended)	Integration theory
1 accepted	false	true
2 accepted	true	0*
3 accepted	direct on acc. integration:0* direct on acad. progress: true	direct on acad. integration: true direct on progress: false
4 accepted	direct on acc. integration:0* direct on acad. progress: true	0*
5 accepted	direct on acc. integration:0* direct on acad. progress: true	direct on acc. integration: true direct on acad. progress: false
6 accepted	0*	direct on commitment and saliency: true direct on acad. progress: false

0* the theory does not include all variables needed for testing

3 Data

For the analyses, data are used from the longitudinal research project "Verder Studeren" (Studying beyond secondary education)[3]. As a part of this project, almost 2000 freshmen at institutions for Higher Education in The Netherlands were surveyed at the end of 1991. Since then these students are followed by means of a questionnaire every fall. In 1995 the last questionnaire was send so far.
The students were evenly sampled from different sectors of higher education (economics, social, health, agriculture, nature, law, language & culture, technic). About half of them were enroled at universities, the other half at institutions for higher vocational education ("HBO"). In this paper we restrict ourselves to university students.
From this database, students were selected with non-missing values for all variables described below. As a result, we have data on 399 students.

The final dependent variable will be the proportion of the total curriculum students have finished after four years. All Dutch university studies have a curriculum of four year, but only 8% of the students have graduated after four year.

We will give a brief description per block of the variables we use in the empirical testing of the model. With the notation q1, q2,.., q5, we indicate the number of the questionnaire.

block I *Pre-university characteristics*
As individual explanatory variables, we use a wide range of pre college attributes, based on the self report of the students: (all q1)

3 The research-team consisted of three parties, namely SCO-Kohnstamm Institute of the Department of Educational Sciences, the Department of Economics, and the Foundation of Economic Research, all of the University of Amsterdam. From the beginning, the intention was to work on the integration of economic and sociological theories.

- gender
- parental education
- parental income
- academic track in secondary education: dummy variable for pre-university education ("VWO")
- grade point average at the end of secondary education

block II Delay of start higher education
- age at entrance college (q1)

block III General - or long term goals (q1)
- intrinsic motivation: score on motivation-item 'I have chosen this course because of its content' (range scores 0-10)
- extrinsic motivation: Likert-type scale 3 items, namely 'I have chosen this study because I want to get:
  a paid job,
  a managerial position,
  an independent position
  (alpha = .68; range from 0 to 10)

block IV Evaluation of the chosen alternative (q1)
- saliency of choice at college entrance, measured by 'my motivation to start this study is x' (x ranging from 0-10)

block V Operational goals (q1)
- intention to be successful at college (0-10)
- intention to be successful the first year (0-10)

blocks VI-VII Framing of outcomes (q1)
- estimated odds of success (final diploma) (0-100)
- estimated duration before graduation (in years)

block VIII Commitments (q2)
- actual hours invested in 1991/92
- student investment, measured one year after entrance, a Likert type scale of 10 items, indicating that students:
  are willing to study hard in order to get good results,
  have a good self discipline,
  tend not to procrastinate,
  are good in time-management,
  (alpha = .79; range from 0 to 10)

blocks IX-XI Academic integration
- evaluation of choice after first year, a Likert type scale of 8 items, indicating the satisfaction with the chosen alternative, like:
  the study was totally different from what I had expected,
  there are more interesting alternatives,
  this study was too theoretical
  (alpha = .77; range from 0 to 10) (q2)
- problematic fit (mismatch) between student's capacities and educational demands: a Likert type

scale of 5 items, indicating that students have problems to keep up with the academic demands of their study like
study is too difficult for me
I had a lack of study skills
I missed essential knowledge
(alpha = .73; range from 0 to 10) (q2)

- studiability, a Likert type scale of 13 items, indicating student satisfaction with
the organisation of classes
the organisation of exams
lots of unproductive activities / waste of time
unbalanced workload: some days overloaded, other days quiet
(alpha = .82; range from 0 to 10) (q3)
- pressure of work, a Likert type scale of 9 items, indicating the amount of complaints about the workload, like
not enough time for preparing classes,
not enough time for preparing exams,
many difficulties with the study tasks
unable to keep up with the time-limits
(alpha = .81; range from 0 to 10) (q3)
- propaedeutic diploma, dummy-variable yes-no (q5)

blocks XII-XIII Commitments three year after entrance

- actual hours spend in class (q3)
- actual hours spend on study tasks outside class (q3)
- student investment, Likert scale with items mentioned before, measured in 1993
(alpha = .84; range from 0 to 10) (q3)

block XIII Evaluation of the chosen alternative three year after entrance

- saliency of choice at college entrance, measured by 'my motivation to start this study is x' (x ranging from 0-10) (q3)

XIV Study results (q5)

- Academic progress after four year: range 0%-100% (100%= diploma)

4 Results

To test the hypotheses, we performed LISREL analyses. We show from the final model we accepted the standardized and total effects of the exogenous variables, the pre-university characteristics of block I, in table 1, part 1 and 2. The standardized - and total effects of the endogenous variables of block II-XIII are shown in table 2, part 1 to 5. Finally, the proportion variance explained is shown in table 3.
The fit of the model is acceptable, with df=200, Chi^2=238.95 (p=.031); GFI=.96 and AGFI=.92.
In 4.1, we restrict the discussion of the results of the basic hypotheses. After that we discuss in 4.2 the results of the final dependant variable, academic progress, more elaborately.

4.1 Hypotheses tested

Hypothesis 1
We had to reject the first hypothesis: pre-university characteristics do not only effect block II to block IX. We had to add effects on block X-XIV to obtain an acceptable fit of the model with the data (see

table 1 part 2). This result is a confirmation of Human capital theory and rejects Tinto's theory.

Hypothesis 2
Extrinsic motivation and saliency of choice do not have a direct effect on the operational goals (see table 2, part 1). Intrinsic motivation has positive effects on both operational goal variables.
So, we may conclude hypothesis 2 is only partly accepted.

Hypothesis 3
Operational goals seem to play an important role in the study careers of university students, not only as hypothesis 3 assumes in the process of academic integration. They also influence the framing of outcomes and student's commitments. The third hypothesis is therefore confirmed, but should be extended to a larger part of the study career (see table 2, part 1 and 2 Intention succ. and intention success 1st year).

Hypothesis 4
The importance of the block Framing of outcomes on academic progress can be derived from the extended Human capital theory. The results show these variables are of big importance at all stages in the study process. So, the fourth hypothesis is confirmed.

Hypothesis 5
Commitments of students, derived from the theory of Tinto, are an essential part of the longitudinal process. Higher commitments of students lead to a smoother accomplishment of the academic integration process and more progress in the study. The hypothesis is accepted.

Hypothesis 6
Academic integration, also derived from Tinto's theory, plays an important role in the academic progress. It also has positive effects on students commitments in 1993.

4.2 results of Academic progress
The final dependent variable in the model is academic progress. We will discuss the results of this variable a little more extensively. First, we see in table 3, that the proportion of explained variance is .39. So, we may conclude we did find some of the mechanisms in the study career process, but not all relevant factors are included in the model yet.

Of the *pre-university characteristics* only parental income has a direct effect on academic progress, but although the total effect is positive, it is not significant. We may conclude from this that in the end no serious social selection takes place. But the study career process shows both positive and negative effects of parental education and parental income, which make the total effects tend to zero. The negative effect of parental education on student investment and the positive effect on odds success and intention to be successful the first year mean that students with lower parental educational backgrounds work harder, while students with higher parental educational backgrounds frame the outcomes more positive and have higher expectations of their success and work less.
Gender has a positive total effect, which means women perform better than men.
There is no direct effect of gender, so we have to look at the indirect pathways which lead from gender to progress. We can see women seem to be better prepared in terms of rational decision making: they make more serious operational goals, have higher commitments and have less problems in the academic integration process. There are no differences in the framing of results between men and women.

Delay of entering higher education is a negative total effect, which means that, no matter what reason

there was for the delay, it decreases academic progress.

General goals do not seem to play an important role in the progress a student has made four years after the beginning of his study.
The same goes for *saliency of choice*. Also the repeated measure of saliency in the third year hardly plays a role at all in the progress process of students.

Operational goals seem to be important, but only if the student intended to get the first year diploma (propaedeutic) in one year, the results after four years also are good. The operational goal 'intention of being successful in getting the propaedeutic diploma (without time-limit)' has a negative effect on the success after four years.

Framing of the outcomes does have both direct and indirect effects on Progress.
The effects of Odds of success is not as we had expected. Our hypothesis was Odds of success has a positive effect, but the results show a negative effect. A positive frame, thinking you will be successful, seems to make a student work more relaxed (time is on his side?). The frame 'estimated duration before graduation' has the expected effects. Both direct and total effect are negative: the longer you expect it will take, the more time you need for graduation.

The *commitment variables of the propaedeutic period* have the expected direction in the total effects. Both have positive total effects and no direct effects. The pathways through which the total effects are achieved go via the commitment variables measured two years after the start of the study.

The effects of all *academic integration* variables, except one, have the expected direction.
Evaluation of choice, and academic mismatch, both scored by the student at the end of the first year, have the expected positive and respectively negative effects. It makes an old dutch saying come true again: a good start makes the work half done. Pressure of work has a strong negative effect on progress. Propaedeutic diploma has a positive direct and total effect.
Studiability, a dutch novelty in higher education policy, shows a negative direct and a non-significant negative total effect, while we had expected it to be positive. Studiability is an indicator for the absence of negative circumstances in the organisation of the course (this is the definition given by the government). An interpretation for the opposite direction of the effect could be: if the circumstances for a student are good, this does not make him work harder. No, the opposite seems to be the case: if you study in a pleasant place, you rather stay there as long as you can.

All *commitment variables three years after entrance* have positive effects on progress, only hours spend studying at home does not seem to be a very distinctive variable. Hours in class and a positive attitude, measured by student investment, are important in academic progress.

5 Final conclusion

In scheme 2 we make the confrontation between the tests of the hypotheses and the expected outcomes based on human capital theory on the one hand and integration theory on the other.

Scheme 2: Confrontation between result testing hypotheses and theories

result hypotheses	Human capital theory (extended)	Integration theory
1 falsified	true	false
2 partly	true	false*
3 accepted	direct on acc. integration: false* direct on acad. progress: true	direct on acad. integration: true direct on progress: false
4 accepted	direct on acc. integration: false* direct on acad. progress: true	false*
5 accepted	direct on acc. integration:false* direct on acad. progress: true	direct on acc. integration: true direct on acad. progress: false
6 accepted	false*	direct on commitment and saliency: true direct on acad. progress: false

False* means: the theory did not include these variables, but there are significant effects found

Scheme 2 shows neither one of both theories has outclassed the other very much. If the goal is to explain students decisions during their study career, one has to use both theories. The integration of the theory of human capital and Tintos theory, leads to a model that is more powerful in explaining academic progress, than models which consist of variables derived from only one of the theories. Both original theories are too restricted in their scope to explain the complex decision process during higher education. As we stated in the theoretical section, we think the integration of both theories can be called an example of empirical research, based on bounded rational theory. Although it is very complicated to develop a causal model which comprises all the relevant variables in this process we think this model is a fruitful start.

Table 1: Standardized direct - and total effects of the final model, part 1

	Gender stand.eff.		**NonPromot.** stand.eff.		**Par.ed.** stand.eff.		**Par.inc** stand.eff.		**Gpa-sec.ed.** stand.eff.		**Acad.track** stand.eff.	
	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot
block II												
age at start			.28	.28							-.59	-.59
block III												
extrinsic motivation			-.16	-.16					-.15	-.15		
intrinsic motivation	.17	.17							.11	.11		
block IV												
saliency of choice	.12	.18								.04		
block V												
intention success		.04		-.05						.03	-.16	*-.06*
intention success 1st year	.10	.11		-.09	.12	.12	*-.09*	*-.09*			-.29	-.11
block VI												
odds success		.04		-.04	.21	.21						*-.02*
block VII												
estimated duration		*-.01*		.02		-.03		*.02*	.15	.14	.21	.24

Table 1: Standardized direct - and total effects of the final model, part 2

	Gender stand.eff.		**NonPromot.** stand.eff.		**Parent.ed.** stand.eff.		**Parent.inc.** stand.eff.		**Gpa-sec.ed.** stand.eff.		**Acad.track** stand.eff.	
	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot
block VIII actual hours study '91	-.12	*.07*	.22	.14	-.13	-.11	.13	.11	.16	.15		.14
student investment	.22	.22		*-.06*	-.13	-.14		*.01*	.21	.30		-.09
block IX evaluation of choice		.11		*.0*		*-.01*		*.0*		.10	-.13	-.16
academic mismatch		-.10	.19	.23		-.05		.05	-.18	-.22		.09
block X studiability		.07		*.0*		*.0*		*.01*		.06		-.05
pressure of work		-.08		.12		*-.01*		.03		-.08		*-.04*
block XI propaedeutic diploma		*.03*		-.09		.05		.02		.06		-.07
block XII actual hours class '93		*.01*		.07		-.07		.04		*.05*		.08
actual hours homestudy '93		*.03*		*.02*		*-.03*		*.01*		.07		*.0*
block XIII saliency of choice'93		.05		*.0*	-.10	*-.09*		*.01*		.05		*.02*
student investment'93		.14		.05		-.12		*.03*		.19		*-.03*
block XIV												
academic progress after 4 years		.08		-.06		*-.02*	.10	*.07*		.13	-.10	-.17

Table 2: Standardized direct - and total effects of the **endogenous variables** of the final model, part 1.

	Age start stand.eff. dir	tot	**extr. mot.** stand.eff. dir	tot	**intr. mot.** stand.eff. dir	tot	**saliency ch.** stand.eff. dir	tot	**intent. succ.** stand.eff. dir	tot	**Intention succ. 1st y.** stand.eff. dir	tot
block III												
extrinsic motivation					*.03**							
intrinsic motivation			*.03**									
block IV												
saliency of choice					.34	.34						
block V												
intention success	-.17	-.17			.23	.23					.31*	
intention success 1st year	.30	.31			.11	.11			.31*			
block VI												
odds success		-.06	.12	.12		.13	.13	.13	.37	.37		
block VII												
estimated duration		.09			.12	*.09*					.28	.28

* correlated error between these two variables

Table 2: Standardized direct - and total effects of **the endogenous variables** of the final model, part 2

	Age start stand.eff.		**Extrin. mot** stand.eff.		**Intrin. mot.** stand.eff.		**Saliency ch** stand.eff.		**Intent. succ** stand.eff.		**Intention succ. 1st y.** stand.eff.	
	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot
block VIII hours study '91	-.23	-.29				.09	.17	.17			.21	.18
student investment	.16	*.01*				*.03*		.05			.15	.24
block IX evaluation of choice		*-.03*		*.01*	.16	.26	.13	.16	.14	.18		.06
academic mismatch		*.02*		*-.01*		*-.03*		*.01*		.04	-.26	-.27
block X studiability		*.02*		*.01*		.04		*.02*		.06		.04
pressure of work	.18	.13		*-.01*		*.0*		*.02*		-.02		-.08
block XI propaedeutic diploma		*.01*		.02		.07		.04		.08		.10
block XII actual hours class'93	-.15	-.17		*.0*		.04		.06		*.0*		*.02*
actual hours homestudy '93		-.07				.03		.03			*.09*	.16
block XIII saliency of choice'93		-.06		.02		.07		.07	-.13	*-.03*		*.03*
student investment'93		-.08	.11	.11		.04		.07		*.0*		.19
block XIV												
academic progress after 4 years		-.14		*.01*		.01		*.02*	-.11	-.14	.23	.39

* correlated error between these two variables

Table 2: Standardized direct - and total effects of **the endogenous variables** of the final model, part 3

	Odds success stand.eff.		**Estimation duration** stand.eff.		**Hours study '91** stand.eff.		**Student investment** stand.eff.		**Evaluation of choice** stand.eff.		**Academic mismatch** stand.eff.	
	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot	dir	tot
block VI Odds success												
block VII estimated duration												
block VIII actual hours study '91			.11	.11			.28*					
student investment			-.16	-.13	.28*							
block IX evaluation of choice	.12	.12		-.03		.07	.24	.24			-.18*	
academic mismatch	-.11	-.11		.06	.24	.17	-.23	-.23	-.18*			
block X studiability	.10	.11		-.04	-.11	*-.03*	.23	.25	.10	.10		
pressure of work		-.04		.06	.17	.17	-.15	-.25		*-.02*	.23	.23
block XI propaedeutic diploma	.09	.15		-.02		*.02*		.09	.19	.19	-.41	-.35
block XII actual hours class'93		-.03		*-.01*	.17	.31	.22	.15	.13	.19	.13	.24
act. hours homestudy '93				*.0*	.14	.19	.15	.15				
block XIII saliency of choice'93	.16	.20	.11	*.08*		.09		.19	.17	.22		*.03*
student investment'93		*.02*		*.05*	.09	.34	.55	.65		*.04*		.07

block XIV												
academic progress after 4 years	-.15	-.11	-.18	-.21		.06		.24	.11	.15	-.13	-.18

* correlated error between these two variables

Table 2: Standardized direct - and total effects of **the endogenous variables** of the final model, part 4

	Studiability stand.eff. dir	tot	**Pressure of work** stand.eff. dir	tot	**Prop. diploma** stand.eff. dir	tot	**hours class '93** stand.eff. dir	tot	**hours home-study '93** stand.eff. dir	tot	**Saliency ch. '93** stand.eff. dir	tot
block X												
pressure of work	-.16	-.16										
block XI propaedeutic diploma		-.03	.22	.22								
block XII actual hours class'93		-.03	.25	.21	-.15	-.15						
hours homestudy '93												
block XIII saliency of choice'93	.18	.20	-.17	-.11		-.04	.26	.26	.14	.14		
student investment'93	.12	.14		*-.01*	-.09	-.12	.14	.17	.22	.24	.13	.13
block XIV												
academic progress after 4 years	-.13	*-.07*	-.24	-.18	.13	.08	.18	.21		.04		.02

Table 2: Standardized direct - and total effects of **the endogenous variables** of the final model, part 5

	Student Investment '93 stand.eff. dir	tot
block XIV		
Academic progress after 4 year	.18	.18

Table 3 Proportion explained variance of the endogenous variables of the model

	Proportion explained variance		**Proportion explained variance**
block II		block VIII actual hours study '91	.18
age at start	.43	student investment	.29
block III		block IX evaluation of choice	.23
extrinsic motivation	.03	academic mismatch	.31
intrinsic motivation	.04	block X studiability	.09
block IV		pressure of work	.19
saliency of choice	.15	block XI propaedeutic diploma	.26
block V		block XII actual hours class'93	.23
intention success	.07	actual hours homestudy '93	.08
intention success 1st year	.11	block XIII saliency of choice'93	.22
block VI		student investment'93	.62
odds success	.23	block XIV	
block VII		academic progress after 4 years	.39

estimated duration	.16		

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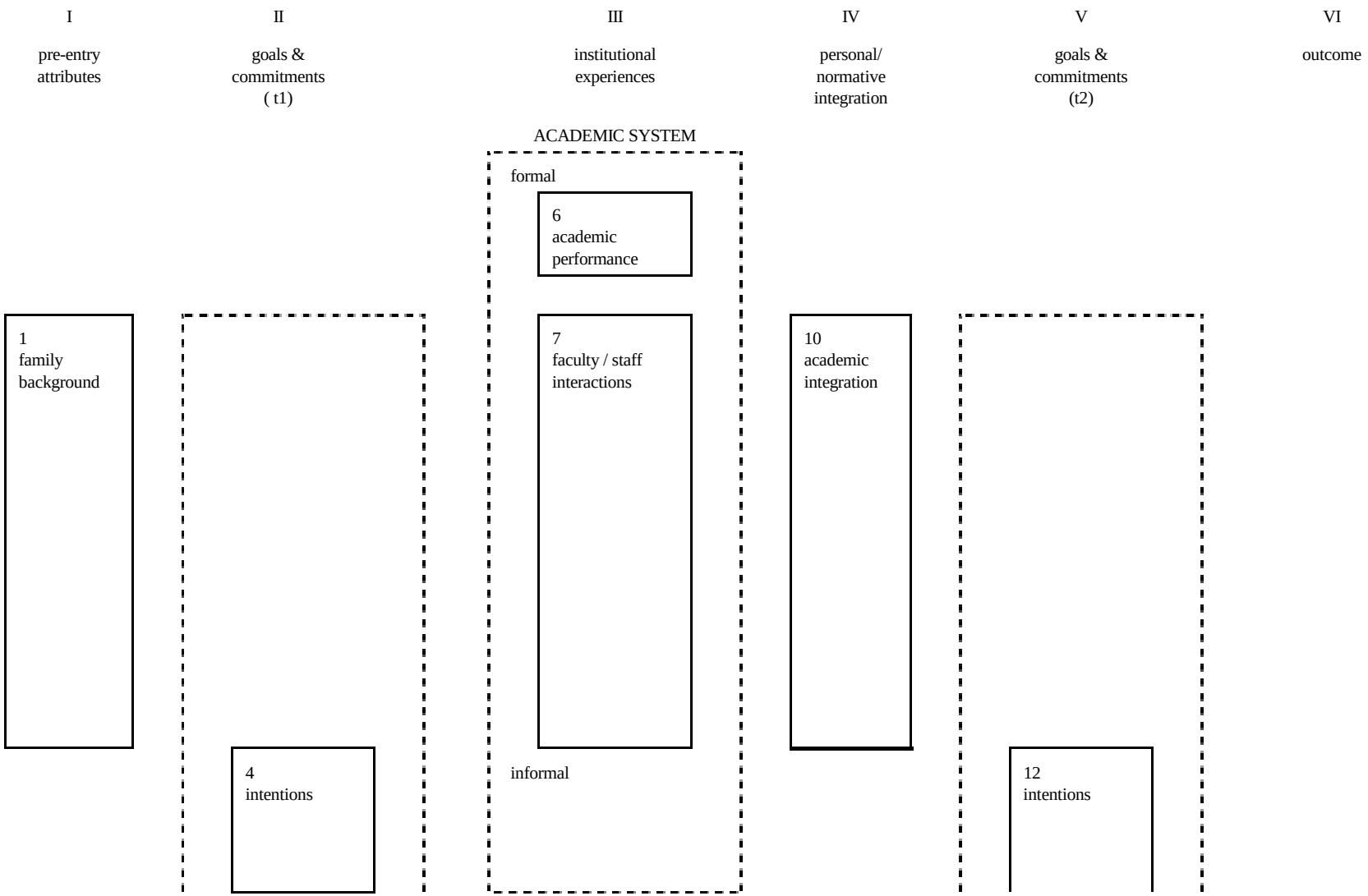
I
pre-entry attributes
II
goals & commitments (t1)
III
institutional experiences
IV
personal/ normative integration
V
goals & commitments (t2)
VI
outcome
ACADEMIC SYSTEM
formal
6
academic performance
1
family background
7
faculty / staff interactions
10
academic integration
4
intentions
informal
12
intentions

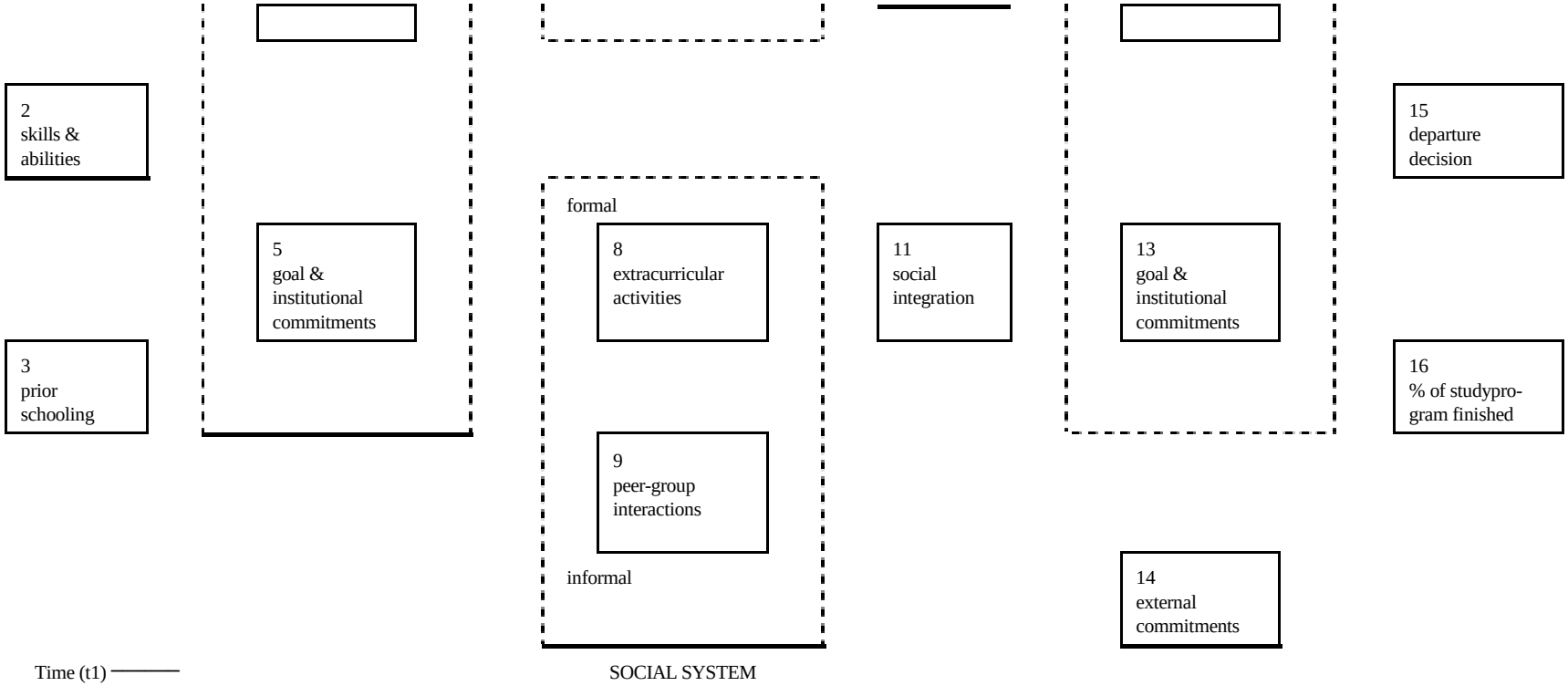

Figure 1 Tinto's model of dropout from college