

Research & Occasional Paper Series: CSHE.15.10

CSHE | Center for Studies in Higher Education

UNIVERSITY OF CALIFORNIA, BERKELEY

<http://cshe.berkeley.edu/>

**EXCELLENCE AND DIVERSITY:
The Emergence of Selective Admission Policies in Dutch Higher Education - A Case
Study on Amsterdam University College**

October 2010

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ABSTRACT

This paper explores the emergence of selective admission policies in Dutch university education. Such policies are being developed to promote excellence in a higher education system that is generally known to be “egalitarian” and increasingly criticized for a lack of differentiation. The changing policy context of admission in Dutch university education and its driving forces and rationales are discussed in the context of European-wide developments such as the Bologna Process. Especially the emergence of selective liberal arts colleges will be presented as a recent excellence initiative. A review of international trends, methods and criteria in selective admission (notably from systems with extensive experience in this field such as the USA), including historical pitfalls, provides an analytical framework for the discussion of the fostering of excellence in combination with the aim for diversity in the student population. The predictive value of selection methods and criteria used at Amsterdam University College (AUC) are evaluated against the study progress and performance of AUC students. This includes academic criteria such as GPA in secondary school, and AUC’s use of interviews. Examining data from AUC’s first entering class in 2009, the college has achieved enrolling students from different national and socioeconomic backgrounds. It is also achieving excellence in terms of study progress and academic performance, including an attrition rate of only 13 percent. The question is whether interviews generate sufficient added value, in particular with regard to the time and costs of this model and with a view to the risk of subjective interpretations of “soft variables” such as student motivation. The answer seems to be that interviews provide extra guidance to both the student and the institution as to whether the student is choosing the right study programme (and not so much as whether he or she is able to complete it successfully). Consequently, the combined model of selection on the basis of prior academic achievement at secondary school (GPA) and personal interviews will be continued. However, specific attention needs to be paid to the fact that the interviewer’s estimate of academic performance seems to be less accurate to predict study success than the actual secondary school GPA (i.e. based on the former more students could have been wrongly rejected than on the basis of the latter).

INTRODUCTION

Dutch Higher Education has a reputation as being extremely egalitarian. There are two reasons for this perception. One, access to higher education is in principle open to all students who have the right type of secondary education qualification, without any further selection upon admission to higher education institutions, such as entrance examinations or the like. Only a few programmes are exceptions to this principle (e.g. schools for fine and performing arts, medical schools, and more recently the liberal arts colleges).

And two, the Dutch universities come out rather equally in global rankings on the basis of (mainly) their research performance. Almost all of them score in the top 200 of the world, but none in the top 20. This is metaphorically identified as a “plain without peaks” and blamed for falling short in generating excellence and (thus) a sufficient degree of competitiveness in the international context. At the same time, it is said that the principle of equity in the approach to access to higher education does not lead to actual equality of opportunity.

As the tertiary level builds on an educational system with early tracking (at age 12) it creates abundant opportunities for those who have the right preparation, are the right age, and the right kind of family situation. But potential students from underserved groups who lack necessary language skills, educational preparation, or have family members to support them, have more difficulty entering the system (OECD, 2008) The identification of the shortfall in the capacity of the system to generate both excellence and diversity at the same time has recently led to new policy

initiatives of mostly an experimental nature and even to a more general call to further differentiate the higher education system as a whole, which will be discussed in more detail below.

THE CHANGING POLICY CONTEXT

The Dutch higher education system has a binary structure, consisting of (13) research universities and (some 40) universities of applied sciences. As indicated above, admission to both types of institutions is in principle open to students with the right type of secondary qualification, i.e. *VWO* (university preparatory education, 6 years) for universities and *HAVO* (senior general secondary education, 5 years) for universities of applied sciences. This paper will concentrate in particular on the recent changes in the university sector. Since the late 1990s several initiatives were taken more or less in parallel towards developing more excellence including the use of selective admission methods. The first one was enforced by applicants protesting against the lottery-based admission to medical programmes with limited access (*numerus fixus*, i.e. one of the exceptions to open access). The three-fold rejection of a highly talented student made the case for the acceptance by the Ministry of Education of partial use (for 50% of applications) of selective admission on the basis of prior academic performance (mainly high school grades) and motivation of the candidates. More recently it was decided that this method will soon be applied to all applicants and the lottery system will be abandoned completely.

The second is the implementation of honours programmes in universities. Well-performing students are encouraged to engage in extra courses adding on average 30 credits to the 180 credits of the three-year bachelor programme (but without extending the duration of the bachelor). They are admitted to the honours programmes on the basis of a selection procedure taking their study results in the first year (or semester) and their motivation into account.

Third is the emergence of “university colleges” which are best understood as liberal arts colleges in US terms (see next section). They apply selective admission policies and their students achieve far-above average study results (i.e. some 85% of all students who started the programme complete the bachelor programme in three years against only some 45% after four years in the university sector in general – excluding students who dropped out in the first year).

The various excellence initiatives described above were all taken by the universities in a rather bottom-up fashion and were later followed by (provisional) regulation and eventually by (a proposed) adjustment of legislation. A national committee (*Commissie Ruim Baan voor Talent*) was established in 2003 to advise the Minister on the development of excellence and to monitor a small number of experiments with selective admission. In its final 2007 report, committee recommended further differentiation of type and level of study programmes, but they were rather reserved in their recommendations regarding selective admission. This would only apply to study programmes with a very specific profile, although the potential positive effect of selection on motivation of student and their study results was not denied. The possibility for selective admission on an experimental basis for which institutions have to apply for each individual programme concerned was continued.

In 2008, the *Sirius* programme for the development of excellence in higher education with an initial budget of 50 M€ was created by the Ministry. Virtually all institutions applied for funding to initiate or extend their honours programmes (or other excellence tracks) and in two cases to create new liberal arts colleges. In the same year the university sector committed itself through an agreement with the Ministry to enrol 10% of students in excellence programmes by 2014. In 2009 the Minister stated that the differentiation of the Dutch higher education system had now to be taken at hand seriously, while referring explicitly to the Californian Model² as an example.

An international advisory committee (the *Commissie Veerman*, including the former chancellor of the University of California) was established. It reported in 2010 that, indeed, the Dutch higher education system needed to be differentiated further. It advised that in the new constellation all higher education institutions would obtain the right to select students upon admission for specific programmes and specific groups of students. A number of conditions were formulated: selection should be complementary to the secondary education qualifications which would still be the in principle basis for admission, selection should not exclude any student at the system level, and selection methods should be evaluated continually. It was also recommended that institutions develop more distinct profiles, referring to U-MAP the European classification of higher education institutions³ (Veerman, 2010).

But at present the regulatory status of selective admission is still experimental. Draft legislation granting the liberal arts colleges the right to select their students on a structural basis was postponed by Parliament after the fall of the government in early 2010. Discussions within the sector continue to focus on the type of methods and criteria that should be applied (academic achievement versus softer criteria such as motivation) and on whether the best moment for selection is upon admission to the first year or at a later point, e.g. during or at the end of the first year. A possible combination with the introduction of differential fees for excellence programmes also remains a complicating factor.

The question now is whether after a decade of mainly discussion and only limited experimentation with selective admission the situation will be changed more profoundly. The Veerman report was embraced by all higher education stakeholders upon publication and the new government (to be established after elections in June 2010) will be advised to implement it comprehensively. Whether or not this will actually lead to more comprehensive approaches to selective admission will not only depend on the political orientations of the new government.

Since the Veerman report remained rather vague on the factual implementation of selection, various concepts will need to be worked out much more concretely, which may result in lengthy procedures. At the same time, it may be expected that the bottom-up initiated experiments and practices with selective admission will continue to develop and the public opinion will shape itself around the results thereof, creating a dynamic driving the further policy development.

And even if the Dutch higher education system would in this respect overcome its perceived "egalitarian" character, this would only be of a partial nature. Excellence may now become a more accepted notion, but the relationship with diversity is still not conceptualised. National policies targeting to increase the participation of minority students in universities are just nascent so far. Only a few institutions have developed admissions practices and an enrolled student profile focused on both excellence and diversity (notably Amsterdam University College (see below) and the VU University Amsterdam to some extent).

EXCELLENCE INITIATIVES: FOCUS ON THE EMERGENCE OF LIBERAL ARTS COLLEGES

The emergence of liberal arts colleges within the Dutch higher education, provides an opportunity to analyze the role of selective admissions within the broader framework of European-wide trends in higher education. Liberal arts colleges⁴ are a typical feature of US higher education. However, the liberal arts tradition has its origins with the great Greek philosophers and constituted the basis of the medieval university in Europe (Glyder & Weeks, 1998; Nussbaum, 2002; Rothblatt, 2003).

The curriculum of the early European universities was organized around the seven liberal arts, which were divided into the Trivium (literary arts: grammar, logic, and rhetoric) and the Quadrivium (mathematical arts: arithmetic, geometry, music, and astronomy). This initial part of university education formed the basis for further training at advanced level in the main professions of that time, such as medicine, law, and theology. At the same time, it should be recognized that the liberal arts model is not part of the mainstream model of higher education anywhere in Europe and it has clearly lost the scope that it continued to have in the USA. But since the 1990s various liberal arts colleges have been established in Europe.

A recent overview and comparative analysis (Van der Wende, forthcoming) shows that at least 25 new initiatives were taken with models ranging from a separate, usually residential, college (though in many cases associated with a larger university) to that of a college or degree program integrated within the larger university. This (re)emergence of liberal education in Europe seems to be a response to the need to differentiate the massified European systems, which are characterized by insufficient diversity and flexibility in terms of types of institutions and programs offered to an increasingly large and diversified body of students (a criticism expressed by the European Commission and the OECD and also recognized by scholars, see for instance Huisman & van Vught, 2009).

More in particular this seems to be related to two main dimensions of differentiation. The first is the quest for broader bachelor programs in order to overcome the disadvantages of too early and over-specialization at undergraduate level. Such broader bachelor programs would aim to enhance learning effectiveness and to generate graduates with skills relevant for the knowledge economy.

The second dimension of differentiation is the search for excellence or elite education in massified and overly egalitarian systems. As one can speak of an almost total decline of elite or top tier higher education in Europe⁵, there is a need to establish more selective branches of higher education focusing explicitly on excellence. These developments coincided largely with the implementation of the Bologna Process, which facilitated these developments as it (re-)instituted undergraduate education as an educational phase in its own right.

Although the scope of the renewed liberal arts initiatives is of course very small on the scale of the European higher education landscape as a whole, it is remarkable that around one third of these initiatives are concentrated in the Netherlands with its relatively small HE system. Consequently, system-level impact may be expected in this context. The Dutch liberal arts colleges are all established as honours colleges of major research universities and therefore constitute a new branch of excellence in Dutch higher education. The first initiative was taken by Utrecht University when it established University College⁶ Utrecht in 1998, soon followed by University College Maastricht (established by Maastricht University) in 2002 and by the Roosevelt Academy in 2004 (also owned by Utrecht University). In 2009

the University of Amsterdam and the VU University Amsterdam jointly established Amsterdam University College (AUC) and Leiden University has opened its university college in September 2010⁷.

The emergence of liberal arts colleges as a new branch of excellence in Dutch higher education can be explained along the same lines presented above for Europe in general, i.e. insufficient differentiation in the massified and strongly egalitarian system. This was underlined by the OECD (2008) which stated that Dutch higher education demonstrates an insufficient level of differentiation, that there is not enough top quality institutions, that the international dimension should be enhanced in terms of students and academic programs, and that too early specialisation should be avoided.

The university colleges with their selective admission policies, high international profiles (30-60% international students, English taught) and broad curricula seem to present an effective response to the weaknesses identified at system level. This has been increasingly recognized by various actors and stakeholders groups and most recently by the *Commissie Veerman* (see above) in whose report on the further differentiation of the Dutch higher education system, the university colleges were set as an example of good practice. Also the fact that legislation has been prepared to grant university colleges specific status in the higher education act and that the Association of Universities in the Netherlands (VSNU) launched a project to disseminate good practice from the university colleges into the mainstream of universities provide evidence of impact at the national system level.

SELECTIVE ADMISSION: SOME HISTORY AND PITFALLS

Although most higher education systems have in principle their own history of selection and consequent exclusion of certain groups of students (often women or students of particular race), the USA is a particularly well documented case study and a rich source for learning for policy makers charged with the design of new or adjustment of existing systems of selection. The lessons learned seem to focus on the complex task of balancing the competing demands of fostering excellence and guaranteeing broad educational access, especially when recognizing the educational and social values of diversity in the student body.

Private colleges and universities in America were the first to broaden their admission policies which had hitherto been based solely on criteria of academic performance and experiment with non-academic performance criteria to help select and, in effect, exclude unwanted students – in particular students from lower economic classes, often from racial and ethnic groups, such as Jews and Catholic Irish. Beginning with Columbia and spreading to other of the Ivy League colleges such as Harvard, Princeton and Yale, these institutions developed culturally biased examinations and required students to provide personal information and even photographs to help control their enrollment⁸. As explained in Jerome Karabel's book on admissions practices among Ivy League institutions, university officials wished to regain control over the composition of the freshmen class, including if necessary the less talented sons of major donors. Central criteria in the new policy were more intangible and highly subjective criteria such as "character", "personality" and "leadership" (also including the person's extracurricular activities) and allowed the universities basically to accept and reject whomever they desired.

This shift from objective academic criteria to subjective non-academic criteria was part of a broader redefinition of "merit". And although the consensus in the US has always been that merit and not inherited privilege should determine the distribution of educational opportunity, there has been no consensus on what merit is. Or rather, as Karabel states, there is no neutral definition of it and it will thus always benefit some groups while disadvantaging others.

Beginning in the 1950's, with criticism of exclusionary practices by mostly private institutions, and accelerated by the spectacular event of Sputnik which fuelled concerns over international competition for talent (institutions of equal reputation, such as the French *Grandes Écoles* and Tokio University still admitted students purely on academic merit), private institutions elevated academic criteria in the selection process. At the same time, selective public institutions began to incorporate more non-academic criteria and develop "outreach" programs to students in high schools, to help broaden their applicant pool and make their enrolled student populations more broadly representative of society.

The 1960s represented the development of a general consensus among selective institutions, both private and public, that academic criteria formed a minimum requirement for admitting students that, combined with a broad range of other factors including socio-economic background and talents, helped institutions select a diverse and excellent group of students each year. The principle of student body diversity being recognized as of general interest for society. To help achieve this goal, most universities also have incorporated "alternative" admission criteria in which special circumstances and talents of student can be recognized and used to admit them.

The University of California's nine campuses with undergraduate programs provides evidence of an ability to achieve these two goals. Admission standards are set to identify talented students who have a reasonable to very high chance of academic success at the university, and who will take advantage of the opportunities afforded to them at the institution.

Recent surveys showed that the undergraduate student body of the University of California is indeed very diverse. Some 55% of the students have at least one parent who was an immigrant. At the UCLA and Berkeley campuses, the most prestigious of the UC system this figure was even 65%. And about 25% of the students are from low income families or first generation students (Douglass, 2007). Student graduation rates at UC are among the highest in the nation. Recent studies also demonstrate that there is a great deal of interchange among undergraduate students that leads to a better understanding of differences in all measures examined: wealth, religion, race/ethnicity, immigrant status, and politics (Chatman, 2008). This supports the view that "The experience of arriving on a campus to live and study with classmates from a diverse range of backgrounds is essential to students' training for this new world, nurturing in them an instinct to reach out instead of clinging to the comforts of what seems natural or familiar" (Ibid, p. 4).

The Californian data underline that excellence and diversity can be effectively combined. And this is also the pursuit of many elite institutions in the US. Changes in admission policies parallel to the ones discussed above were undertaken in many other elite institutions in the USA (Bowen & Bok, 1998), including extensive efforts to enhance diversity for example through outreach programmes (see for an interesting example from a top liberal arts college Aries, 2008).

In developing admissions standards and practices, selective public universities are relatively transparent, outlining the criteria used and the process of selection⁹. However, in private institutions, which do not have the same level of public accountability, the selection process, and how admissions officers go about the actual decision making, is largely done in secret.

How for instance they balance incentives to reward high academic accomplishment, athletic skills, legacy (parents who studied at the same institution)¹⁰, minority status, and the ability to pay full tuition? (Stevens, 2007). There is also evidence that despite all efforts there is still a substantial pool of low-income students that have the ability to succeed in elite institutions but are not given what it takes by the admission officers on their way into the system (Bowen *et al*, 2005). And even that in the present "age of diversity" racial or ethnic stereotypes may play out in new ways against certain applicants, e.g. discrimination against Asian American applicants with on average test scores substantially above those for any other group (Golden, 2006).

The section above concentrated on the experiences in the USA, which by all means are not the only ones to hold important lessons for Dutch higher education. The widening participation policy in the UK has for instance led to the fear that standards will drop as a result. But also here diversity is defended as an educational value and in the interest of society: "We will learn more from those people, those ideas, and those phenomena that we do not know, than from those we know only too well. We need to pursue this diversity of people and ideas to increase the quality of our core business – which is to learn. We need, and we wish, to prepare our students to become active and confident participants in a multicultural and globalised society" (Brink, 2008). The current discussion on excellence and diversity and the selection system of the *Grandes Écoles* in France is very interesting as well.

The French minister recently insisted that more low-income and minority students should be enrolled by these institutions. A fierce debate is going on whether this is better supported by selection methods that include general intellectual and social development (such as the current *concours*) or rather by purely cognitive skills tests such as in mathematics. This brings us to the important issue of methods and criteria used in selection and the role of cultural capital therein, which will be discussed in the next section.

SELECTION METHODS AND THE PREDICTIVE VALUE OF CRITERIA

As stated above, in the Dutch context the discussion on selective admission focuses on type of methods and criteria that should be applied and on whether the best moment for selection is upon admission to the first year or at a later point, e.g. during or at the end of the first year.

Selection is expected to contribute to excellence, that is to enhance "study success", i.e. both learning efficiency and effectiveness, expressed in terms of a students' progress (number of credit points earned per year) and performance (the average of grades obtained, GPA). The likelihood that selection of students contributes to promoting excellence in the sense formulated above and within the Dutch context is supported by national research literature (see for an overview: Veerman, 2010; Cremonini *et al*, 2010):

- Selection of students enhances their motivation and commitment to study (Korthals, 2007; Warps, 2009);
- Selection of students leads to higher learning efficiency and lower drop out rates (Dooge 2005; Eurlings-Strop 2009);
- Selection leads to a higher quality of the teaching and learning process (Korthals, 2007).

International research literature generally supports these findings. See for instance Bowen *et al* (2009) who found a very strong positive correlation coefficient (0.88) between selectivity and raw graduation rates across a large cluster of public universities in the USA. When adjusted for differences in both students' entering characteristics and demographic variables that relationship is still strongly positive and statistically significant. Differences in these rates between flagship and state universities seem to be related to peer effects (going to college with students more likely to graduate makes a student more likely to graduate) and the role of norms or expectations (highly selective institutions hold a widely shared expectation that essentially everyone will graduate).

Dutch research literature also provides some insights into the type of criteria that should be used in the selection process. First of all, a distinction is made between (Drenth, 2004):

- Selection based on criteria that can be affected by the candidate him/herself (the "merit model"), i.e. selection on the basis of previous educational achievements measured in terms of a (final examination) grade point average (GPA) or a GPA for certain specific subjects.
- Selection based on basically all means which may be considered an indication of a relationship with future academic performance (the "efficiency model") such as tests, personality data, estimates of motivation and interest, etc.

Drenth then indicates that selection in line with the merit model is preferred because past performance is usually the best predictor for comparable performance later on. Research also shows that student performance in higher education is better predicted by final GPA than by test scores. This was demonstrated in the Netherlands by among others De Gruyter (2005, 2006). He claims that the predictive value of final GPA is high enough to be used for selective purposes. Also Borleffs (2009) and De Bruijn (2010) argue that there is sufficient evidence that good final GPA is predictive of academic achievement. Drenth also states that selection on this basis generates the required commitment and stimulates motivation, which is absent from selection based on criteria that applicants themselves can not influence.

Furthermore, he argues that measuring such things as motivation in the sense of attitude, commitment and perseverance on the basis of essays, motivation letters, or interviews are unreliable and should not be part of a sound selection process. Moreover the motivation to study is also not a stable feature, but situational determined.

These insights are generally substantiated by the international research literature. Long-term empirical research in the USA shows that cumulative¹¹ grade point average in secondary education is a stronger predictor of academic achievement in the bachelor phase than scores on standardized tests¹²: "[Cumulative] high school GPA proved the best predictor not only of freshman grades in colleges, but also of long-term college outcomes" (Geiser, 2008, p 2). It also offers fewer disadvantages for candidates from disadvantaged and minority groups: "Admissions criteria that emphasize demonstrated achievement over potential ability are more likely to promote educational equity" (*ibid*, p 2) (see also Douglass, 2009). It should be noted, however, that the predictive value of school grades can be influenced by differences in level between secondary schools (see for instance Ogg *et al*, 2009).

But this is more likely in education systems such as in the US and the UK, than in the Netherlands, where there is a Dutch secondary tiered-system with at every level a national written exam (see Drenth, 2004). Nevertheless, a growing discrepancy between grades for the school-based examinations and the national written examination should be compiled (De Lange & Dronkers, 2006, 2007). What should also be taken into account is the fact that a system of early tracking as in the Netherlands (selection at 12 years based on the *CITO* test taken at the end of primary school) can negatively influence school careers, which is more often the case for students from minority backgrounds (OECD, 2008; Terwel, 2006; Werfhorst & Mijs, 2007).

This may require an "in context" assessment of prior academic achievement for these groups such as described by Douglass (2007, see above) and (Brink, 2008). It could in this respect for instance be wrong to reject a candidate for reasons of repeating a class (or classes) or for having followed a "stack route", since this can be the consequence of a low referral from primary school on the basis of the *CITO* score (which occurs more frequently in the case of minority students) or of language deficiency in the case of refugee students who entered the education system later and consequently learned the Dutch language later than their peers.

Finally, Drenth's observation concerning the weak validity of selection based on motivation in the sense of attitude, commitment and perseverance deserves extra attention. Beyond the problems of weak validity and reliability, this relates also to the influence of cultural capital. Bourdieu's theory of cultural reproduction (1977) seeks to explain the link between social class of origin and social class of destination in terms of the impact of cultural capital on educational attainment. He argues that cultural capital consists of familiarity with the dominant culture in a society. The possession of cultural capital varies with social class, yet the education system assumes the possession of cultural capital. This makes it very difficult for lower class pupils to succeed in the education system.

Bourdieu describes the ways in which the criteria of university examiners reflect the values of the dominant classes, and argues that the more vague the demands of the examiners are, the less chance students from the lower classes will have of meeting these demands. In other words, the more vague the demands of the gatekeepers are the more important the role of cultural knowledge in meeting them (Zimdars *et al*, 2009). Consequently the extent to which a candidate possesses cultural capital is particularly influential in selection systems that are based on or make use of "soft indicators". The example of the use of diffuse admission criteria such as "character", and "personality" at Ivy League institutions in order to solve the "the Jewish problem" (Karabel, 2005) has been discussed before.

Recent empirical research in the Netherlands on the internationalization in secondary education sheds some interesting new light on the issue of social (and cultural) reproduction (Weenink 2008, 2009). Internationalized streams (bilingual education or *TTO* and streams preparing for the international (IB) or European baccalaureates) have been established since the 1990s and are strongly on the rise in the Netherlands. They compete for the best pupils with the *gymnasiums* (more classical type elite grammar schools with Latin and Greek) and are particularly popular with parents with a strong international orientation -- the new cosmopolitans. It was found that pupils in gymnasiums and internationalized streams both obtained the highest test scores (*CITO*) and school recommendations at primary level, whereas the average test score of pupils attending regular pre-university (*VWO*¹³) streams is significantly lower.

At the same time, the majority of parents of children who attended internationalized streams resembled the parents of children at regular pre-university streams, while parents of children who attended gymnasiums had a significantly higher class position and educational level.

Weenink suggests that this indicates a diverging process of social reproduction between an upwardly cosmopolitan fraction ("new elite") and an established fraction of the Dutch upper middle class ("old elite"). The notion of expatriates as "global elites" has been related to the populations of international schools and studying for the IB has been identified earlier as a strategy for social elites to opt out of the national educational systems. Indeed, the number of non-expatriates that send their children to international or IB schools is also in the Netherlands on the rise.

AUC'S APPROACH TO SELECTIVE ADMISSION

Amsterdam University College (AUC) is a small-scale international liberal arts and sciences college (three year bachelor honours) with an intensive teaching model in a residential setting. The students engage in small international classes with personal attention and interaction with lecturers and get support and advice from a personal tutor on planning their study programme.

The AUC liberal arts and sciences programme differs from traditional, single subject, university programmes in that it places particular emphasis on integrating insights from different perspectives, focusing on far-reaching themes and real-world problems in science and society¹⁴. Interdisciplinary learning is supported by the development of scientific reasoning and strong analytical skills. In addition, students deepen their knowledge by choosing a major in the Sciences, Social Sciences or Humanities. In addition to their intellectual skills, students are encouraged to advance their personal and social development in the context of the international community of AUC in the multicultural city of Amsterdam. As is reflected in its motto, AUC aims to combine "Excellence and Diversity in a Global City"¹⁵.

Based on the scientific and historical insights regarding admission as presented above, AUC has chosen to base its selection procedure for admission in particular on criteria related to prior academic performance, i.e. (cumulative) GPA, with particular attention to scores for English and Maths, since skills in these subjects are essential to AUC's educational concept. This is supplemented with background information about previous school experiences and academic performance through school leaving documents¹⁶ and letters of recommendation from former teachers. It is noted that GPA may under certain circumstances in fact not reflect the actual academic ability of the student. Students who feel this is their case are encouraged to explain the reasons for this in their application¹⁷.

Other (softer) factors are taken into account mainly to explore whether the applicant's motivation to study at AUC corresponds to what the program is actually offering. For instance why does the candidate apply for a broad (interdisciplinary) and intensive study programme, which themes in the curriculum do appeal to him/her and why? To

what extent will his/her expectations with respect to the international environment and campus life at AUC match with what is expected from students in this context. This is especially important since the liberal arts model is relatively new in the Dutch context and so are residential colleges. To this end the student provides a motivation letter and a personal essay which are discussed more in detail during the admission interview.

As said, these “soft” criteria should be considered very carefully. For example, “international orientation” should not be confused with “international experience”. The student should have a genuine interest in participating in an international community, but this is not necessarily equal to having undertaken a lot of international activities already. In some social circles, trips abroad or “gap years” are more obvious than in others, and for a student who comes from an environment that provides fewer such opportunities, studying at AUC could entail a great opportunity in this respect.

In this way, AUC seeks to achieve a solid (high predictive value) and objective (to avoid bias on soft indicators) selection method. Institutional research is in place to constantly monitor the validity of the criteria used. Training is provided to the assessors to guarantee the best possible reliability in the use of the selection methods and tools. Cooperation with secondary schools (especially some with high minority populations) has been established to develop methods for “in context” assessment of applications from students with a-typical school careers.

The serious caution with respect to the use of “soft indicators” is based on the “lessons learned” as discussed above, which are all the more important for AUC since its mission is to combine excellence and diversity. Consequently, and in parallel to the consideration of individual students on their personal performance and profile, AUC also pays attention to the composition of a socially coherent yet diverse cohort of students. AUC seeks to establish an academic community that reflects the social, cultural and economic diversity of our globalizing world and that fosters global knowledge and international and intercultural learning through ongoing dialogue among people with a variety of experiences and life views.

AUC therefore aims to put together a student body with a high academic profile and a mix of social, cultural and economic backgrounds, as the best teaching and learning environment to foster global knowledge and international and intercultural learning¹⁸. Consequently AUC is committed to non-discrimination, and will admit students of any race, national or ethnic origin, colour, religion, age, gender, sexual orientation, marital status or physical disability. To help ensure equality of opportunity for all students, a scholarship programme is available¹⁹.

AUC currently admits a maximum of 200 students per year. Both Dutch and international students are welcome to apply. The fact that students thus have different backgrounds in terms of the national education system they come from raises extra challenges for the selection process in terms of the assessment of their prior and future performance. This is done on the basis of current methods for the comparison of academic qualifications taking into consideration the principles of recognition as laid down in the Lisbon Convention on the Recognition of Qualifications concerning Higher Education in the European Region, as developed by the Council of Europe together with UNESCO, which is the key legal instrument for recognition of qualifications across Europe.

The student is in principle eligible for admission to AUC if he or she has a secondary school diploma equivalent to the Dutch VWO, including the International Baccalaureate. Apart from the secondary school diploma and grade lists, the applicant sends in an application essay, a personal statement (letter of motivation) and recommendations from the head of your secondary school and (former) teachers. A technical review is carried out by AUC to assess eligibility of the candidate and possibly for identification of deficiencies.

The next step entails the first reader who assesses the in principle suitability of the candidate by assessing the dossier with a focus on:

- academic excellence: the ability to meet the academic demands of the AUC programme; the grade point average (GPA) will be used as an indicator of this
- in particular the level of proficiency in English and mathematics
- motivation and ambition to study an intensive and broad programme
- commitment to contribute to AUC’s international student and campus life

On the basis of this assessment students are invited (or not) for a personal interview, which is carried out by one or two interviewers (other than the first reader). Prior to the interview, the interviewers take notice of the applicant’s dossier, including their secondary school grades, recommendation letters, essay and comments of the first reviewer of the dossier. The interviewer(s) score their assessment on the following dimensions:

- Academic Performance

- Intellectual Curiosity
- Communication Skills
- Self-confidence /Maturity
- Ambition
- Contribution to the AUC Community
- International Orientation

They conclude their report with an estimation of the likelihood the applicant will succeed at AUC and a final advice for admission. After the interview the AUC Admissions Committee decides which students should be invited to study at AUC. These decisions are made in a scenario-based way, leaving very little room for discussion of individual dossiers.

RESEARCH QUESTIONS

Institutional research at AUC is aimed at establishing an evidence-based method of selection for admission to undergraduate university education, on the base of predictive indicators of study success, with the purpose of promoting excellence and diversity.

It focused on the following questions:

- How can excellence (study success) in undergraduate university education be predicted? - What are the factors that explain most variance in terms of excellence (study success)?
- To what extent do these processes and factors vary in relation to the diversity of students' background in terms of their national education system of origin (*secondary school system*) and their socio-economic background?

PRELIMINARY EMPIRICAL FINDINGS

The research questions stated above have been investigated for the first time on the basis of empirical data gathered during the first academic year of the first cohort of students at Amsterdam University College, who have started in September 2009 (class of 2012). Obviously, the limitations of such a first measurement should be taken into account when generalizing the results (see conclusions and discussion).

A database was constructed containing all data gathered during the admission process: secondary school grades of the applicants, scores on several dimensions assessed during the interview, etc (see previous section). These admission variables were compared with the academic results obtained by the students during their first year at AUC in order to investigate the relationship between them. A linear model was constructed to yield a predictive model for academic results on the basis of the admission variables. The results are presented below.

First, the cohort is described quantitatively (descriptive statistics). In the following sections the relationships between various (sets of) dependent and independent variables is explored. It is noted that since these analyses relate to the *complete* first cohort of AUC (not a sample of it), and no generalizations to other populations are primarily intended, it may be subject to debate whether there is a function for inferential statistics, which address the relation between a sample and the population it is drawn from. In this study, effects of differences will be expressed primarily in terms of effect size (ES), as the main indicator for effects within this population. Secondly and in order to meet common practice, statistical tests and according significance levels are presented with the effects of differences and correlations.

BASIC CHARACTERISTICS OF THE AUC STUDENT COHORT

The basic characteristics of the 189 students who have started in September 2009 are shown in several figures in Appendix A²⁰. The students of this cohort are almost evenly distributed over gender, a slight majority is female (57%). Their average age at the start of their studies is 19.5 years, virtually the same for males and females (19.6 and 19.4 years, respectively). The students come from diverse secondary school backgrounds, the distribution is shown in Appendix A, Figure A1. About half of the students (53%) have a *Dutch VWO* background. The second largest group (16%) holds an *International Baccalaureate*, followed by 10% having graduated with the German *Abitur*. US secondary school diploma's and UK A-levels form only small groups (4% and 3%, respectively), and will be excluded from further analysis here. The remaining group (14%) comprises a broad range of different secondary school diploma's.

Dutch VWO ('Voorbereidend Wetenschappelijk Onderwijs': University Preparatory Education, see footnote xiii) takes six years. About half-way this period, VWO students choose a selection of courses, a so-called *course profile*. The final exam consists of the chosen profile courses. This is relevant as these profiles include rather different

combinations of subjects taken. With their course profile, the students also choose a mathematics profile and level. This is relevant since these differ substantially in terms of the mathematical skills and level they are trained at.

There are four different profiles: NT – Science and Technology, NG – Science and Health, EM – Economics and Society, CM – Culture and Society, and four kinds of mathematics. The NT and NG profiles are sciences-oriented subjects, the EM and CM profiles are more associated with social sciences and humanities. Maths profile A has an emphasis on Statistics, B on Calculus; level 1,2 (A1,2; B1,2) is more advanced than level 1 (A1; B1) Because each course profile demands a specific kind of mathematics, the profile of mathematics is to a certain extent related to course profile: A1 is roughly associated with CM, A1,2 with EM, B1 with NG and B1,2 with NT. Although, students may choose a higher level of mathematics than minimally demanded, as is reflected in Appendix A, Figures A2a and A2b.

The largest group, near half (47%) of the students has stated to prefer Social Sciences as a major. About a quarter (26%) chose Sciences, 14% Humanities and 13% didn't know yet which major they would choose. As is shown in Figure A3, gender was almost equally distributed within each major, with the Social Sciences having slightly more males and Sciences and Humanities having slightly more females.

Students' secondary school backgrounds relate in different ways to their preferred majors (see Figure A4). To mention the most notable differences:

- Relatively many IB students chose Social Sciences (61%) as a major (47% over all)
- Relatively many VWO students chose Sciences (33%) and relatively few chose Humanities (9%)
- German Abitur students chose relatively often for Humanities (28%) and few for Sciences (6%), although many Abitur students did not know their preferred major at the time of the admission²¹.

The secondary school grades of the three largest secondary school groups are displayed in Figures A5 a-c. It is not simple to compare secondary school grades, since grading scales and methods differ from one country and system to another. Therefore analyses of secondary school grades are performed within these school-type groups.

INTERVIEW VARIABLES

The cohort presented above was selected from a larger (> 400) group of applicants. From them 319 were eventually invited for an interview. In these interviews the applicants' abilities were scored on several dimensions, yielding the following interview variables²²:

As primary variables:

- Academic Performance (*ACPF*)
- Intellectual Curiosity (*INCUC*)
- Communication Skills (*COSK*)
- Self-confidence /Maturity (*SECO*)
- Ambition (*AMBI*)
- Contribution to the AUC Community (*CONT*)
- International Orientation (*INTO*)

As secondary (advisory) variables, based on the primary variables:

- Likelihood to Succeed (*LSUC*)
- Final Advice (*FADV*)

All these dimensions are scored on a 3-points scale²³, except for *FADV*, the interviewer's final advice for admission, which is scored on a 5-points scale.

The following results concern the interview scores on all recorded interviews, 319 in total (i.e. including the students who were offered a place at AUC, as well as those who were not).

It appears that most interview scores are relatively high (see Figure A6a-b), compared to the scale on which they are scored (1-3, except for *Final Advice*: 1-5). This might suggest a 'ceiling effect', which means that variance of scores is restricted at the highest end of the scale. This is most likely caused by the fact that selection has already taken place before the interview. Technical review reveals students that are not eligible and/or have deficiencies and once the applicants are invited for the interview, they have already been considered suitable for admission by the first reviewer. Of course, when correlating the interview scores with measures of study success, as is addressed later on

in this article, the interview scores are expected to be even more restricted to the high end of the scale, because those numbers concern only those students who have been admitted.

There appear to be minor differences of interview scores between some secondary school groups (e.g. IB scores high on *Communication Skills*, VWO scores relatively low on *International Orientation*). But all over the VWO, IB and Abitur groups show comparable scores on most of the interview variables.

Table 1. Rank correlations (Spearman's rho) between the interview scores.

	ACPF	INCU	COSK	SECO	AMBI	CONT	INTO	LSUC	FADV
Academic Performance	1.00								
Intellectual Curiosity	<u>.46**</u>	1.00							
Communication Skills	.15**	.31**	1.00						
Self-confidence / Maturity	.22**	.34**	.40**	1.00					
Ambition	.29**	.40**	.15**	<u>.45**</u>	1.00				
Contribution to AUC Community	.24**	.34**	.18**	.31**	.30**	1.00			
International Orientation	.03	.19**	<u>.48**</u>	.32**	.06	.34**	1.00		
Likelihood to Succeed	<u>.52**</u>	<u>.65**</u>	.27**	<u>.42**</u>	<u>.45**</u>	<u>.47**</u>	.28**	1.00	
Final Advice	<u>.61**</u>	<u>.74**</u>	.40**	<u>.46**</u>	<u>.49**</u>	<u>.45**</u>	.30**	<u>.78**</u>	1.00

** Correlation is significant at the 0.01 level (2-tailed).

In Table 1 the most striking correlations ($\rho > .40$) have been underlined. It shows that at the level of the primary variables moderate correlations seem to exist between:

- *Communication Skills* and *International Orientation* ($\rho = .48$),
- *Academic Performance* and *Intellectual Curiosity* ($\rho = .46$),
- *Self-confidence* and *Ambition* ($\rho = .45$).

Stronger correlations were found between the secondary (advisory) interview variables *Likelihood to Succeed* and *Final Advice* and the primary interview variables *Intellectual Curiosity* and *Academic Performance*.

Likelihood to succeed correlated most strongly with:

- *Intellectual Curiosity* ($\rho = .65$)
- *Academic Performance* ($\rho = .52$)

Final Advice mainly correlates with:

- *Intellectual Curiosity* ($\rho = .74$)
- *Academic Performance* ($\rho = .61$)

And to a lesser extent with:

- *Ambition* ($\rho = .49$),
- *Self-confidence/Maturity* ($\rho = .46$),
- *Contribution to the AUC Community* ($\rho = .45$)

These outcomes suggest that the interviewer's assessment of the likelihood of the student to succeed at AUC and his (consequent) final advice for admission are most strongly influenced by his assessment of the academic and intellectual abilities of the student.

As could be expected, *Likelihood to Succeed* and *Final Advice* are strongly correlated to each other ($\rho = .78$).

Table 2. Factor analysis (Principal Component Analysis with Varimax Rotation and Kaiser Normalization) on the interview scores.

	Rotated Component Matrix			
	1	2	3	4
<i>Academic Performance</i>	<u>.87</u>			
<i>Intellectual Curiosity</i>	<u>.74</u>	.34	.13	.13
<i>Communication Skills</i>	.23	.21	<u>.86</u>	
<i>Self-confidence /Maturity</i>	.13	<u>.76</u>	.40	.11
<i>Ambition</i>	.30	<u>.83</u>		.11
<i>Contribution to AUC Community</i>	.26	.18		<u>.89</u>
<i>International Orientation</i>			<u>.74</u>	.53
<i>Likelihood to Succeed</i>	<u>.73</u>	.35	.11	.34
<i>Final Advice</i>	<u>.79</u>	.36	.22	.23

Note: Only factor loadings higher than .10 are shown.

The pairing of primary interview variables based on the correlation matrix seems to be confirmed by a four-component factor analysis. Table 2 shows the four rotated components and the factor loadings for every interview variable, which account for 80% of the variance. The highest factor loadings of each variable are underlined to indicate the dominant factor for that variable.

Factor 1 comprises mainly:

- *Academic Performance*
- *Intellectual Curiosity*

Factor 2 covers mainly:

- *Self-confidence*
- *Ambition*

Factor 3 contains primarily:

- *Communication Skills*
- *International Orientation*

Factor 4 consists mainly of:

- *Contribution to AUC Community*
- *International Orientation*

The factor analysis shows that *Likelihood to Succeed* and *Final Advice* load highest on Factor 1, which confirms that interviewers base their assessment of the likelihood of the student to succeed at AUC and his (consequent) final advice for admission mainly on the (perceived) academic and intellectual abilities of the candidate. Other factors are also taken into account, but to a much lesser extent (<50% of the factor load on factor 1).

As our first research question focuses on how excellence (study success) can be predicted, the next section will look into the relationship between secondary school results and the scores on interview variables and the actual study success of the students in their first year at AUC.

MEASURES OF STUDY SUCCESS.

As stated before, study success can be understood as both learning efficiency and effectiveness, expressed and measured in terms of:

- Study progress: the number of credit points a student has obtained (*ECP, European Credit Points*)²⁴; and
- Study performance: the grades the student has achieved (*GPA, Grade Point Average*).

Final measures of study success, i.e. time to degree and completion rate cannot be assessed at AUC as yet.

These measures depend of course to some extent on the design of the curriculum. It should therefore be noted that if a student fails a course at AUC, he/she does not get the opportunity to take a re-exam the same year. If one (or more) course is failed, the student will be addressed by the tutor to arrange an agreement to continue on probation. If a student fails too many courses, that can be a ground for expulsion. As a consequence of this policy, students are expected not to fall behind to a large extent. On the other hand, students who can't keep up might leave AUC sooner compared to programmes that allow students to study at their own pace. As an effect of this, the variance in the number of credit points earned is reduced.

The AUC's first year's curriculum principally consists of 10 courses of each 6 ECP (60 in total a year in accordance to the European Credit Transfer Scheme, ECTS). However, students who have a GPA of 3.0 or higher and who are not on probation, have the opportunity to take an 11th course, which a number of students have done. The maximum number of credit points obtained by some is therefore 66 ECP.

On average students who completed their first year at AUC (165 in total) earned 57²⁵ ECP (51 ECP including drop outs) and achieved a GPA of 3.1, with 64% of them at honours level ≥ 3.0 , including 30% at cum laude level ≥ 3.5 .

Figure 1a-b shows the study results of those students who have completed the first year, broken down over secondary school background. Students who withdrew from AUC, permanently or temporary, before the end of the year are excluded from these analyses concerning study success²⁶. Since reasons for withdrawal may vary, neither their grades nor obtained credit points, are necessarily a valid reflection of the student's academic ability. Attrition (drop out) is further discussed and analysed in a special section below, including a comparison of correlations with and without the drop-out students.

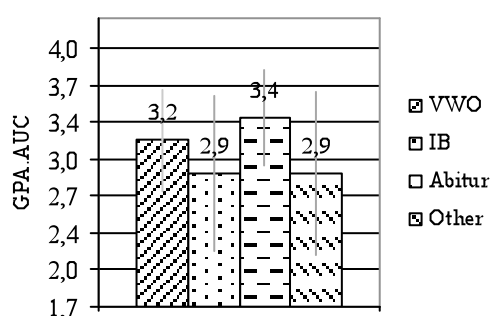


Figure 1a. AUC study results GPA of the first year, for the three largest secondary school groups (N=159).

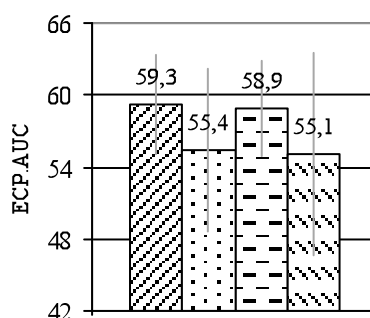


Figure 1b. AUC study results ECP of the first year for the three largest secondary school groups (N=159)

Figure 1a shows that the Abitur and VWO groups appear to perform best on GPA (*Effect Size ES* = 0.68; Analysis of Variance: $F(3, 155) = 4.9, p < 0.01$), as well as in terms of ECP (Figure 1b, *ES* = 0.81, $F(3, 155) = 6.0, p < 0.01$); the IB group performs weakest, as well as the students from other secondary school backgrounds.

It seems that Sciences students would yield the best grade results (Figure A7a, *ES* = 0.39), but this effect is not significant ($F(3, 155) = 1.3, p > 0.05$). Social Sciences students seem to obtain the least number of credit points (Figure A7b, *ES* = 0.35), but this effect is also not significant ($F(3, 155) = 1.6, p > 0.05$).

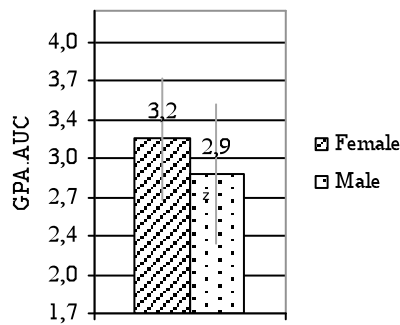


Figure 2a. AUC study results GPA of the first year, for males and females (N=159).

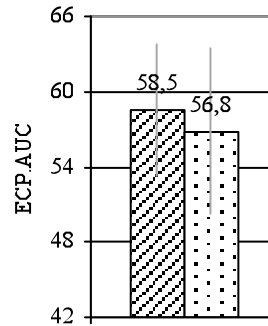


Figure 2b. AUC study results ECP of the first year, for males and females (N=159).

As shown in Figures 2a and 2b, female students obtain the higher grades than males ($ES = 0.58$, $F(1, 157) = 12.9$, $p < 0.001$), and also seem to earn more credit points ($ES = 0.30$, $F(1, 157) = 3.4$, $p = 0.07$). This effect is not entirely attributable to the differences in secondary school grades, as female students had only slightly higher secondary school GPA ($ES_{VWO} = 0.16$, $F(1, 85) = 0.50$, $p > 0.4$). This is not an uncommon finding in higher education, where women appear to be more successful students than men, a trend that has been observed in various countries over the last decade.

RELATION BETWEEN STUDY SUCCESS AND ADMISSION VARIABLES: SECONDARY SCHOOL GRADES AND STUDY RESULTS AT AUC

In the following section, the AUC students' study success, in terms of GPA and ECP, will be analysed against their secondary school grades. First, the correlations between them will be presented, followed by a scatterplot for the VWO group.

Table 3a. Correlations (Pearson product-moment correlation coefficient r) between GPA at AUC and the Secondary School GPA of the VWO, IB and Abitur groups.

Secondary School		SS GPA	Grade Maths	Grade English
VWO	(N = 87)	.70**	.57**	.35**
IB	(N = 21)	.47*	.32	.43*
Abitur	(N = 16)	.58*	.55*	.43

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 3b. Rank correlations (Spearman's rho) between AUC ECP and Secondary School GPA of the VWO, IB and Abitur groups.

Secondary School		SS GPA	Grade Maths	Grade English
VWO	(N = 87)	.47**	.47**	.12
IB	(N = 21)	.22	.25	.12
Abitur	(N = 16)	.27	.26	.33

*. Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

As it appears from Table 3a, there is a relatively strong correlation between secondary school grades and study results in terms of GPA: the three largest groups of secondary school type all show positive correlations. For the VWO group, secondary school GPA even account for about 50% ($r = .70$, $r^2 = .49$) of the variance in grades. This is very high, compared to other studies after the relation between secondary school grades and academic grades²⁷.

Also the *secondary school Maths grade* seems to have a strong relation with the grades at AUC (VWO: $r = .57$) and even *SS Grade English* correlates reasonably with *AUC GPA* (VWO: $r = .35$).

Other secondary school backgrounds, IB and Abitur, show somewhat comparable, reasonably strong correlations between SS grades and AUC grades, although not all correlations reach significance, probably related to a low number of observations. Overall, averaging all grades, as reflected in the *secondary school GPA*, seems the best predictor of AUC grades (*GPA*).

Although using different correlation coefficients (Pearson product-moment correlation coefficient for *GPA* and Spearman's rank correlation for *ECP*), it seems that the relation between secondary school grades and *ECP at AUC* is less strong than the relation with AUC grades, but still relatively strong, compared to other studies (e.g. $\rho = .47$ – VWO, see Table 3b). (For IB and Abitur, the number of observations are probably too low to produce significant correlations). For study progress, measured by credit points, SS Maths grade seems to be an equally good predictor as SS GPA.

It seems that (secondary school) grades predict (study) grades better than they predict progress (credit points), but it might also be that the lower correlation with credit points is related to a restriction of the range of values in *ECP*, caused by the already mentioned probation policy at AUC: if students are given the opportunity to study at their own pace, lower values of *ECP* would occur. And if students would be given the opportunity to take re-exams, one might also expect less low *GPA* values to occur, restricting the correlations of secondary school grades with *GPA*, explaining lower correlations found in regular programmes.

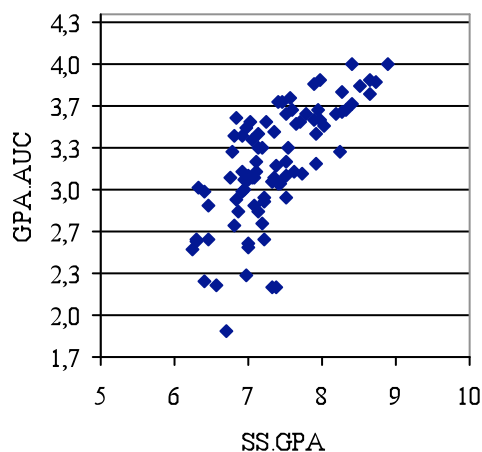


Figure 3a. Scatterplot of the relations between Secondary School GPA and AUC GPA of the VWO group. ($N=87$)

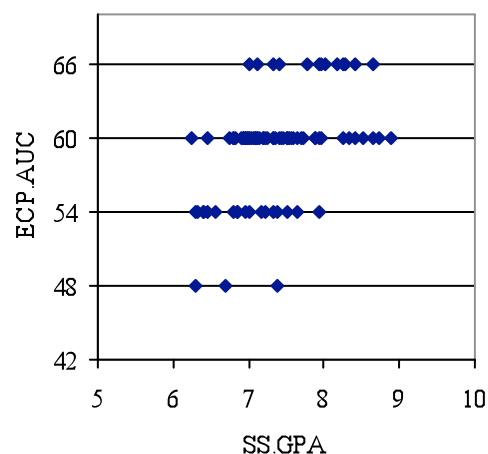


Figure 3b. Scatterplot of the relations between Secondary School GPA and AUC ECP of the VWO group. ($N=87$)

The relationship between secondary school average grades (*SS.GPA*) and AUC average grades (*GPA.AUC*) of the VWO group ($r = .70$) is plotted in Figure 3a. The linear relation seems apparent in this figure, although the linear elliptical shape of the cloud seems to be more pronounced at the higher end of the *GPA.AUC* distribution, which might suggest that (high) secondary school grades are a better predictor for higher undergraduate grades than for lower ones.

The relation between *SS.GPA* (VWO) and *ECP.AUC* ($\rho = .47$) is shown in Figure 3b. Note that the highest number of credit points (66 ECP) only could be obtained by students with *AUC GPA* of 3.0 or higher, and who are not on probation, which might inflate these correlations to a certain extent.

The above mentioned correlations are calculated *excluding those students who interrupted with their study before the end of the year (permanently or temporarily)*. If these students were included, the correlations between secondary school grades and GPA and ECP at AUC would be $r = .59$ and $\rho = .41$, respectively, for the VWO group. However, these correlations would mean less, since the reasons for drop-out, being not all related to academic ability, add noise to these numbers. As a result, grades, and particularly credit points, of these students are incomparable. The relation between attrition and predictors like secondary school grades and interview scores is discussed in the section on withdrawal below.

RELATION BETWEEN STUDY SUCCESS AND ADMISSION VARIABLES: INTERVIEW SCORES

Table 4. Rank correlations (Spearman's rho) between the interview scores and GPA and ECP (N = 159).

Interview variable	GPA	ECP
<i>Academic Performance</i>	.55**	.38**
<i>Intellectual Curiosity</i>	.21**	.14
<i>Communication Skills</i>	-.04	-.19*
<i>Self-confidence / Maturity</i>	.15	.01
<i>Ambition</i>	.11	.13
<i>Contribution to AUC Community</i>	.22**	.15
<i>International Orientation</i>	.02	-.07
<i>Likelihood to Succeed</i>	.28**	.17*
<i>Final Advice</i>	.33**	.19*

*. Correlation is significant at the 0.05 level (2-tailed).

**.. Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows that from the interview variables the interviewer's judgement on *Academic Performance*, i.e. how well the student would perform academically, correlates the highest of all interview variables with the academic grades and credits, even more than the interviewer's estimation whether the student would be likely to succeed and his/her final advice for admission. Though, as we will see in the linear regression model in the following section, *Academic Performance* does not add much to the secondary school grades, on which it is based. Other variables, such as *Intellectual Curiosity* and *Contribution to the AUC Community* also seem to correlate moderately with study results at AUC.

These correlations might be restricted to some extent by the earlier mentioned 'ceiling effect', caused by the fact that the interview scores of those students *who have been admitted* are expected to lie at the high end of the scale. Nevertheless, there seems to be enough variance in interview scores to produce some substantial correlations, particularly with *Academic Performance*.

PREDICTIVE LINEAR MODEL OF STUDY SUCCESS

To come to an overall model of prediction of study results at AUC, the predictive variables of secondary school grades and interview scores were put into a Multivariate General Linear Model. The most simple linear model would be to include only *the secondary school GPA*, since they have the highest correlation with study success, i.e. is solely the best predictor. This simple model may be improved by adding the *SS Maths* and *English grades*, to allow for different weighing of these secondary school subjects. For the VWO group, a further optimization of the explained variance may be sought after by adding the *course profile* and the *kind of mathematics* to the model to distinguish between kind and level of subjects.

Further optimization is investigated by adding different combinations of interview variables to the model. The added value of this extension is discussed below. The results of the Multivariate GLM for the VWO group are stated in Table 5 (Tables for VWO, IB and Abitur are shown in Appendix B, Table B1a, B1b and B1c. The proportion explained variance is expressed by *Multiple R² (R²)*; the *Adjusted Multiple R² (R² adj.)* is used to correct for the chance effect of adding more variables to the model.

Summarizing the different models with their predictive variables:

- Model 0: *Secondary school GPA*
- Model 1: *SS GPA + Grade Math + Grade English (= SS grades)*
- Model 2a: *SS grades + Course Profile*

- Model 2b: SS grades + Course Profile + Maths Kind (= SS grades*, 'extended')
- Model 3a: SS grades* + Interview Final Advice
- Model 3b: SS grades* + Interview Academic Performance
- Model 3c: SS grades* + Interview Factor 1 (Academic Performance + Intellectual Curiosity)
- Model 3d: SS grades* + Interview Factor 2 (Ambition + Self-confidence /Maturity)
- Model 3e: SS grades* + Interview Factor 1 (Academic Performance + Intellectual Curiosity) + Factor 2 (Ambition + Self-confidence /Maturity)

Table 5. Explained variance Multiple R^2 and Adjusted Multiple R^2 for different models of prediction of GPA and ECP for the VWO group.

Predictive Model		GPA		ECP	
Simple		R^2	R^2 adj	R^2	R^2 adj
Model 0	SS GPA	.49	.49	.22	.21
Model 1	SS GPA, Maths, English	.50	.49	.26	.24
Model 2a	SS grades + course profile	.55	.51	.38	.32
Model 2b	SS grades + course profile + maths kind	.58	.52	.41	.33
Model 3a	SS grades* + interview FADV	.58	.52	.41	.33
Model 3b	SS grades* + interview ACPF	.58	.51	.41	.33
Model 3c	SS grades* + Factor 1	.58	.51	.41	.32
Model 3d	SS grades* + Factor 2	.61	.54	.41	.32
Model 3e	SS grades* + Factor 1+Factor 2	.61	.53	.41	.30
Complex					

The following summary concerns the results of the predictive model for the VWO group:

- *Secondary School grades:*
 - As is displayed in Table 5, Model 0, the simplest model, containing only SS GPA, accounts for approximately 50% of the variance in the criterion variables (academic results): $R^2 = 0.49$, R^2 adj. = 0.49.
 - Differentiating between Mathematics and English (Model 1) only adds slightly to the prediction strength ($R^2 = 0.50$), but corrected for the chance effect of adding two extra variables to the model, this is no real improvement (R^2 adj. = 0.49).
 - Adding *Course profile* and *Math level* contributes to the proportion explained variance: (Model 2a: $R^2 = 0.55$, R^2 adj. = 0.51; Model 2b: $R^2 = 0.58$, R^2 adj. = 0.52).
- *Interview scores:*
 - Adding the interviewers estimation of the *Final Advice* for admission does not seem to add to the predictive strength (Model 3a, $R^2 = 0.58$, R^2 adj. = 0.52).
 - Replacing *Final Advice* with the interview variable highest correlating with study success, *Academic Performance*, to the model does not improve the predictive strength of the model either (Model 3b, $R^2 = 0.58$, R^2 adj. = 0.51). Apparently, the *Academic Performance* interview variable does not provide additional value to the 'academic performance' estimation of the SS grades (which seems obvious).
 - Adding *Intellectual Curiosity* to complete Factor 1 in the model, does not help either (Model 3c, $R^2 = 0.58$, R^2 adj. = 0.51).
 - When replacing the other interview variables with Factor 2 interview variables *Ambition* and *Self-confidence / Maturity*, the model explains 61% of the variance in GPA (Model 3d, $R^2 = 0.61$, R^2 adj. = 0.54), the highest amount of explained variance so far. It appears that this factor of interview variables *does* have added, although limited, value over the secondary school grades.
 - Adding the Factor 1 variables *Academic Performance* and *Intellectual Curiosity* does not gain more predictive strength (Model 5, $R^2 = 0.61$, R^2 adj. = 0.53).

In conclusion: the most simple predictive model accounts for 50% proportion explained variance, the most complex model adds about another 11% to a total of 61%. However, when correcting for the addition of variables, the surplus of the complex model is a mere 4% (Model 3e: R^2 adj. = 0.53 against Model 0: R^2 adj. = 0.49).

When applied to the data of the IB and Abitur groups (see Appendix B, Tables B1b and B1c), it seems that a comparable predictive linear model may be justified to explain more or less comparable amounts of variance in the AUC academic results, although there seem to be differences in, for instance, the even greater added value with the IB students for *course profile* (for the IB group particularly *level of English*) and *kind and level of maths*, and the

interviewer's assessment of the applicants *Academic Performance*. With the Abitur group, *Maths and English grades* seem to provide added value, as well as the *Factor 2* interview variables, which resembles the VWO group.

However, the results of IB and Abitur groups should be regarded with caution, as the number of students in these groups are small, which enhances chance capitalization effects for models with increasing numbers of parameters to be estimated – as is reflected in the decreasing *Adjusted Multiple R²*. The predictive power of the admission variables, and differences therein for the various secondary school backgrounds, may be investigated further in research on future cohorts of students at AUC.

STUDENT WITHDRAWAL / ATTRITION

Students may discontinue their study programme for various reasons. Of the total 189 students who have started the first AUC year in September, 24 (13%) have left before or at the end of the year, 165 (87%) completed the first year successfully.

Although it seems that students leave for a mix of reasons, the main categories seem to be:

- related to academic performance: student was expelled or
- voluntarily left because of lacking academic results;
- related to course and programme content: wish to pursue another course or career; or
- unrelated to performance or content: personal reasons, health related or unknown.

These different reasons for leaving, distributed over the three largest secondary school groups, are depicted in Figure A8. As shown in this figure, various reasons for interrupting the study programme are found in the different secondary school groups. The relative number of IB students who left or were expelled appear to be the highest among the school groups.

When results are lacking, it may be that the student's ability fell short to complete the study, or his or her motivation was lacking to put the effort into it. In that case, it is often difficult to tell which way the causal relation goes: were the results low because the motivation was lacking or was the motivation waning caused by disappointing study results? To gain insight in the intertwining relation between stated exit reasons and academic ability, we investigated the relation between exit reasons and GPA at AUC: $GPA < 2.7$, $GPA \geq 2.7$.

This very small scale investigation shows that the *performance related* exit reasons, *expelled* and *left for academic results*, seem indeed to be related to GPA results lower than 2.7, as was to be expected. Students who left before and thus without obtaining any grades have various reasons to do so, related or not to programme content. Students who left with high grades ($GPA \geq 2.7$) seem not to be driven away by the programme content, but state personal reasons for departure. These numbers are too small to reach reliable conclusions, but this first categorization proves useful, to develop more insight into why students leave the programme. This analysis will continue be applied to future cohorts.

To explore the predictability of drop-out, the relation between secondary school GPA and exit reasons was examined more closely, by comparing the rank percentages of SS GPA per exit category with those of the total group.

From this comparison, it appears that in the VWO group, performance related drop outs (*expelled* and *left because of academic results*) show quite low rank percentile numbers on SS GPA, which seems to confirm the relationship between low SS GPA and low GPA at AUC. In other words: not only for the students who *stayed at AUC* (see Table 3a), but also for the students who *left because of lacking academic performance*, there seems to be a relation between SS GPA and GPA at AUC. In the *content-related* and *performance-unrelated* exit reason groups, SS GPA do not seem to be that low, compared to the average of the total group, indicating that SS GPA does not signal a possible risk of drop-out in categories other than those related to academic performance. Also this was to be expected.

With a view to a broader application of selective admission on the basis of secondary school grades, it is important to understand the predictability of drop out better than the current data provide for. Small scale statistical modelling suggests that rejecting the student with the lowest SS GPA of every group VWO, IB and Abitur, would not have reduced the total number of students who have successfully completed the first year, as all these students have dropped out (although not all for straightforward academic reasons). When discarding the lowest three of each group, of the nine rejected students, five have dropped out (again, not all for straightforward performance related reasons). It seems, that if SS GPA criteria for admission would have been sharpened, as to reject VWO students with GPA 6.0

or lower, IB students with GPA under 4.0 and Abitur students under 8.0, these five students would have been rejected without reducing the total number of students who would have successfully completed the first year.

From this statistical experiment it seems that secondary school grades provide a signalling function in predicting only for part of the drop-out. When used to increase admission standards, one should, however, account for those students who would be unrightfully rejected, as some of them might have been able to succeed with the study.

When looking at the interview scores of the students who dropped out, it appears that their academic performance as assessed by the interviewers might indicate a risk for getting expelled, since the interview score on that dimension seems fairly low. On the other hand, this does not easily yield a useful selection instrument, since many students fall in the same lowest range of scores have successfully finished the first year.

More precisely, it appears that when having discarded all students with *Academic Performance* interview score of 2 or lower, 51 students would not have been admitted, of which 9 indeed have dropped out (although not all for straightforward performance related reasons): 4 are expelled, 1 left for academic reasons, 2 for content-related reasons and 2 for personal reasons. 42 would have been denied access who have successfully completed the year. In other words, for every rightfully rejected applicant on this criterion, at least four would have been unrightfully rejected.

Again, in the examined cohort of students, the drop-out numbers are too small for robust statistical analysis on multiple dimensions. The presented findings only indicate questions and issues that need to be followed up in further research.

CONCLUSIONS AND DISCUSSION

This research contributes to the development of an evidence-based method of selection for admission to undergraduate university education that is based on predictive indicators of study success, and with the purpose of promoting excellence and diversity. The research questions addressed is how excellence (study success) in undergraduate university education can be predicted. More precisely, which factors addressed in the admission process explain most variance in study progress and performance and to what extent these factors vary in relation to the diversity of students' backgrounds.

The data presented above present a preliminary analysis of results on the first year of the first class of Amsterdam University College. Consequently, limitations of such a first measurement should be taken into account in interpreting the results and generalizing these to a wider context.

In summary to these preliminary results point out that:

- AUC is achieving excellence in terms of study progress (57 ECP on average obtained per student in the first year for those who successfully completed the first year and 51 on average including drop outs) and performance (GPA of 3.1 for those who successfully completed, with 64% at honours level ≥ 3.0 , including 30% at cum laude level ≥ 3.5), and an attrition rate of only 13%.
- Diversity occurs with respect to secondary school background: Dutch VWO & German Abitur students perform on average stronger than IB students and students from other secondary school backgrounds. Female students perform on average better than male.
- Predicting excellence seems to focus on variables related to prior academic achievement (as measured for secondary school GPA. Strongest correlations were found between Secondary School GPA and GPA at AUC (.70 for VWO, .58 for Abitur and .47 for IB) and between Secondary School GPA and ECP obtained at AUC (.47 for VWO, .27 for Abitur and .22 for IB).
- After an initial assessment of secondary school records and accompanying documents, a selection of potential students is invited for an interview. It seems that the interviewers also strongly focus on academic performance, since the interviewer's assessment of the likelihood of the student to succeed at AUC and his (consequent) final advice for admission are most strongly correlated with his assessment of the academic and intellectual abilities of the student (.60 - .70). Other factors, such as ambition, self confidence, contribution to the AUC community, communication skills, and international orientation, are also taken into account, but to a much lesser extent.
- Accordingly, the interviewers assessment of academic performance is the interview score with the highest correlation to both GPA (.55) and ECP (.38). In other words, other than academic performance related variables

or the interviewer's score based on that, contribute little to the explained variance and thus to the predictability of excellence in terms of study success.

- Secondary school GPA also appears to predict attrition better than interview scores (even on single score for academic performance), as the former more precisely discriminate between successful students and drop outs than the latter.

The correlations found between secondary school GPA and GPA and ECP at AUC are stronger than those found in previous Dutch research on the predictive strength of secondary school grades for study success in university. The first reason for this may be that prior studies usually take study success in university over at least three years into account, with in general a declining correlation between SS GPA and study success over the subsequent years. In this study only the first year results are measured and it can be expected that also here the relationship will weaken over time, leading to more modest correlations between SS GPA and study success in the total undergraduate period.

A second reason may be that the difference between the correlations found for GPA would be explained by the fact that AUC does not allow students to take re-exams, as regular university programmes in the Netherlands usually do. Consequently, the range of grades at AUC is larger and affects the correlation score positively. In the same fashion one can assume that context, or the way in which the study programme is organised, also affects the number of ECPs obtained. Rules and regulations regarding failing a course are much stricter at AUC than in regular programmes.

The role of context implies that students with the same abilities would not necessarily demonstrate the same study success in a regular study programme. In order to test to what extent the predictive value of the indicators is contingent on context, a group of students with similar secondary school GPAs needs to be examined in terms of their university GPA and ECP in the first year of a regular programme.

Although course profile and (related to that) the level and kind of mathematics add only moderately to the explained variance by secondary school GPA as a whole, student failure in a range of compulsory courses in the first year turned out to be strongly connected with their secondary school grade on mathematics. Consequently, admission requirements for mathematics have been enhanced (from a 7 to an 8 on the Dutch 10-point scale). The class of 2013 reflects an average math score of 7.8 in comparison to 7.1 for the class of 2012. And their overall GPA rose from 7.3 to 7.7. The continuation of this research will point out more precisely how much the difference in mathematic ability affect and explain study success.

Given the dominant predictive value of prior academic performance (SS GPA), the earlier mentioned 'merit' model (Drenth, 2004) seems preferable, even more so since this is more under the control of the students and encourages their effort at secondary school.

The question is whether interviews generate sufficient added value (in particular with regard to the time and costs of this model) and the risk, as set out in the first part of this paper, on subjective interpretations of in particular "soft variables". Interviewers need to be constantly aware of this since AUC's objective is to combine excellence and diversity (i.e. of the risk to jeopardise equity in access).

At this stage, the answer seems to be that interviews provide extra guidance to both the student and the institution as to whether the student is choosing the right study programme (and not so much as whether he is able to complete it successfully).

Consequently, the combined model of selection on the basis of prior academic achievement at secondary school (GPA) and personal interviews will be continued. However, specific attention needs to be paid to the fact that the interviewer's estimate of academic performance seems to be less accurate to predict study success than the actual secondary school GPA (i.e. based on the formed more students could have been wrongly rejected than on the basis of the latter).

At the same time, alternative measures to ensure informed and conscious study choice could be considered.

Finally the next phase of this study will need to address diversity of the student body in terms of their socio-economic background and a range of related variables.

REFERENCES

- Aries, E. (2008). *Race and Class Matters at an Elite College*. Philadelphia, PA: Temple University Press.
- Bowen, W.G. & Bok D. (1998). *The Shape of the River*. Princeton, NJ: Princeton University Press.
- Bowen, W.G., Chingos, M.M. & McPherson M.S. (2009). *Crossing the Finish Line: Completing College at America's Public Universities*. Princeton, NJ: Princeton University Press.
- Bowen, W.G., Tobin E.M. & Kurzweil M.A. (2005). *Equity and Excellence in American Higher Education*. Charlottesville, VA: University of Virginia Press.
- Borleffs, J. (2009). *Onderwijs en opleiden, over kunde en kunst*. Inaugural lecture held on 23 November 2009.
- Bourdieu, P. (1977) 'Cultural Reproduction and Social Reproduction'. In: J. Karabel and A.H. Halsey (eds) *Power and Ideology in Education*. Oxford: Oxford University Press.
- Brink, Chris (2008). "Standards will Drop" – and Other Fears About Widening Participation. *Higher Education Management and Policy Journal*. Vol 21, issue 1, pp. 19-39. Paris: OECD.
- Brujin, J.A., de. (2009). *Selectie drukt uitval*. ScienceGuide. <http://www.scienceguide.nl/selectie-drukt-uitval.aspx> [Website bezocht op 16-6-2010].
- Chatman, S. (2008). *Does Diversity Matter in the Education Process? An Exploration of Student Interactions by Wealth, Religion, Politics, Race, Ethnicity and Immigrant Status at the University of California*. Center for Studies in Higher Education, University of California, Berkeley. <http://cshe.berkeley.edu/publications/publications.php?id=299> [Website visited on 16-6-2010].
- Cremonini, L., W. van Niekerk & H. Vossensteyn (2010). *Selective Admission in Higher Education: Risks and Limiting Conditions*. Achtergronddocument Commissie Veerman. Enschede: Center for Higher Education Policy Studies.
- Dooge, W. (2005), *Selectie aan de poort loont!*. In: THEMA Tijdschrift voor Hoger Onderwijs & Management. - Vol. 11, 2005, nr. 4.: 33-36.
- Douglass, J.A. (2007). *The Conditions For Admission: Access, Equity, And The Social Contract Of Public Universities*. Stanford University Press.
- Douglass, J.A. (2009). *SAT Wars: The University of California and Standardized Testing*. Paper presented at the conference Rethinking Admission, April 15 and 16, 2009.
- Drenth, P.J.D. (1997). *Gewogen loting gewogen*. Advies van de Commissie Toelating Numerus Fixusopleidingen.
- Drenth, P.J.D. (2004). *Selectie aan de poort van het hoger onderwijs*. In: THEMA Tijdschrift voor Hoger Onderwijs & Management. - Vol. 11, 2004, nr. 4.: 48-51.
- Geiser, S. (2008). *Back to the Basics: In Defence of Achievement (and Achievement Tests) in College Admissions*. Center for Studies in Higher Education, University of California, Berkeley. <http://cshe.berkeley.edu/news/index.php?id=56> [Website visited on 16-6-2010].
- Glyder, D. & Weeks, D.L. (eds.) (1998) *The Liberal Arts in Higher Education. Challenging Assumptions Exploring Possibilities*. Lanham: University Press of America. Hannover College.
- Golden D. (2006). *The Price of Admission: How America's Ruling Class Buys Its Way into Elite Colleges - and Who Gets Left Outside the Gates*. New York: Three Rivers Press.
- Gruyter, D.N.M., de, Yildiz, M. & 't Hart, J. (2005). *Presteren in het VWO en het HO. Deelonderzoek van experimenten met selectie: selectie op basis van vooropleidinggegevens*. Universiteit Leiden: ICLON.
- Gruyter, D.N.M., de, Yildiz, M. & 't Hart, J. (2006). *VWO-examenresultaten en succes in de propedeuses Geschiedenis en Psychologie. Deelonderzoek van experimenten met selectie: selectie op basis van vooropleidingen*. Universiteit Leiden: ICLON.
- Gruyter, D.N.M., de, Yildiz, M. & 't Hart, J. (2006). *VWO-examenresultaten en succes in de propedeuses Rechten. Deelonderzoek van experimenten met selectie: selectie op basis van vooropleidingen*. Universiteit Leiden: ICLON.
- Huisman, J. & F.A. van Vught (2009). Diversity in European Higher Education: Historical Trends and Current Policies. In: F.A. van Vught. *Mapping the Higher Education Landscape. Towards a European Classification of Higher Education*. Springer (pp. 17-39).
- Karabel, J. (2005) *The Chosen: The Hidden History of Admission and Exclusion at Harvard, Yale and Princeton*. New York: Houghton Mifflin.
- Kehm, B. & P. Pasternack (2009). The German "Excellence Initiative" and its Role in Restructuring the National Higher Education Landscape. In: D. Palfreyman & T. Tapper (Eds.) *Structuring Mass Higher Education. The Role of Elite Institutions*. Routledge (pp. 113-128).
- Korthals, A.H. (2007). *Wegen voor talent*. Final report by Commissie Ruim Baan voor Talent. Den Haag.
- Lange, M., de & Dronkers, J. (2006). *Hoe gelijkwaardig blijft het eindexamen tussen scholen? Discrepancies tussen de cijfers voor het schoolonderzoek en het centraal examen in het voortgezet onderwijs tussen 1998 en 2005*. Badia Fiesolana, Europees Universitair Instituut 2007/03.
- Lange, M., de, & Dronkers, J. (2007). *Groeide de ongelijkwaardigheid van het eindexamen tussen scholen verder in 2005. Discrepancies tussen de cijfers voor het schoolonderzoek en het centraal examen in het voortgezet*

- onderwijs- 2005 versus 1997–2004*. Paper presented at the Onderwijsresearchdagen 2007, Groningen, 6-8 June 2007.
- Nussbaum, M. (1997). *Cultivating humanity: a classical defense of reform in liberal education*. Cambridge, MA: Harvard University Press.
- OECD (2008). *Reviews of Tertiary Education - The Netherlands*. Paris: OECD.
- Ogg, T., Zimdars, A. & Heath, A. (2009). *Schooling Effects on Degree Performance: a comparison of the predictive validity of aptitude testing and secondary school grades at Oxford University*. In: *British Educational Research*, Vol. 35, No. 5, 2009, pp.781 – 807.
- Os, W. Van (2007). *Selection to the Master's Phase at the Binary Divide, A Dutch Case Study*. In: *Tertiary Education and Management*. Vol. 13, No. 2, June 2007, pp. 127–140.
- Palfreyman, D. & T. Tapper (2009). Oxbridge: Sustaining the International Reputation. In: D. Palfreyman & T. Tapper (Eds.) *Structuring Mass Higher Education. The Role of Elite Institutions*. Routledge (pp. 303-320).
- Rothblatt, S. (Ed.) (1992). *The OECD, the Master Plan and the California Dream: A Berkeley Conversation*. Center for Studies in Higher Education University of California, Berkeley.
- Rothblatt, S. (2003). *The Living Arts: Comparative and Historical Reflections on Liberal Education*. Washington: Association of American Colleges and Universities.
- Severiens, S.E. & Wolff, R. (2009) Study Success of Students from Ethnic Minority Backgrounds: An Overview of Explanations for Differences in Study Careers. In: Tight, M., Mok, K.H., Huisman, J. & Mophew, C. (eds) *The Routledge International Handbook of Higher Education*. Routledge: New York, pp.61-72
- Stevens M.L. (2007). *Creating a Class: College Admissions and the Education of Elites*. Cambridge, MA: Harvard University Press.
- Terwel, J. (2006). *Is de school een sorteermachine? Schoolkeuze en schoolloopbaan van leerlingen van 10-16 jaar*. Amsterdam: Vrije Universiteit Amsterdam
- Urlings-Strop, L.C., Stijnen, T., Themmen, A.P.N. & Splinter, T.A.W. (2009). Admissions - Selection of medical students: a controlled experiment. *Medical Education* 2009; 43: 175–183.
- Veerman, C. P. (2010). *Differentiëren in drievoud*. Advies van de Commissie Toekomstbestendig Hoger Onderwijs.
- Warps, J. (2009), *Studiekeuze en studiesucces*. ResearchNed Nijmegen.
- Weenink, D. (2008). Cosmopolitanism as a Form of Capital: Parents Preparing their Children for a Globalizing World. *Sociology*, 2008. Volume 42(6): 1089–1106.
- Weenink, D. (2009). Cosmopolitan and Established Resources of Power in the Education Arena. *International Sociology* 2007; 22; 492
- Wende, M.C. van der (2010), Internationalization of Higher Education. In: Penelope Peterson, Eva Baker, Barry McGaw, (Editors), *International Encyclopedia of Education*. volume 4, pp. 540-545. Oxford: Elsevier.
- Wende, M.C. van der (forthcoming). The Emergence of Liberal Arts and Sciences Education in Europe: A Comparative Perspective. In: *Higher Education Policy*.
- Werfhorst, H.G. van de & J.J.B. Mijs (2007). *Onderwijsdifferentiatie en ongelijkheid. Nederland in vergelijkend perspectief (Educational tracking and inequality. The Netherlands in Comparative Perspective)*. Report for the Ministry of Education, Culture and Sciences. Amsterdam: Amsterdam Institute for Advanced Labour Studies.
- Zimdars, A., Sullivan, A. & Heath, A. (2009). Elite Higher Education Admissions in the Arts and Sciences: Is Cultural Capital the Key? *Sociology*. 2009. No. 43. p. 648.

Appendix A. Figures.

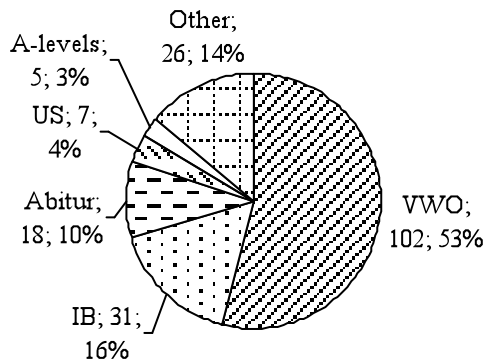


Figure A1. Distribution of students over secondary school types.

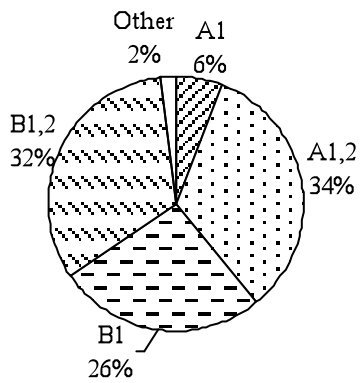


Figure A2a. Distribution of students with VWO background over course profiles.

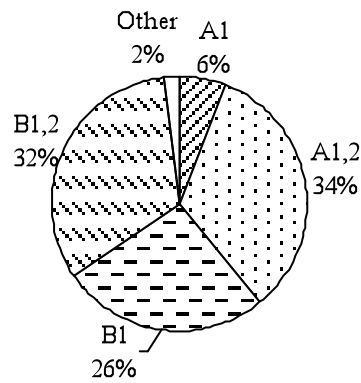


Figure A2b. Distribution of students with VWO background over kinds of maths taken at secondary education.

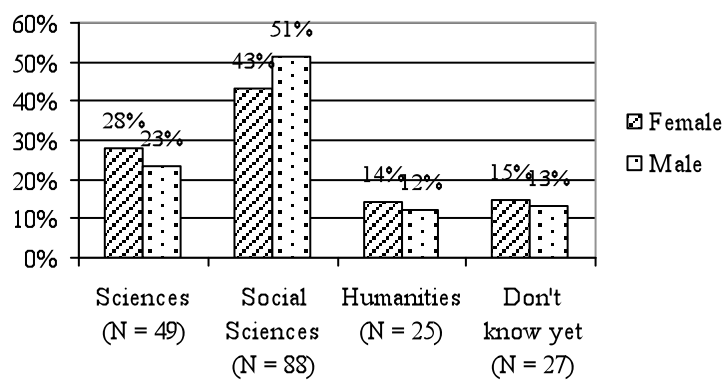


Figure A3. Preferred (intended) majors at the admission stage, distributed over gender.

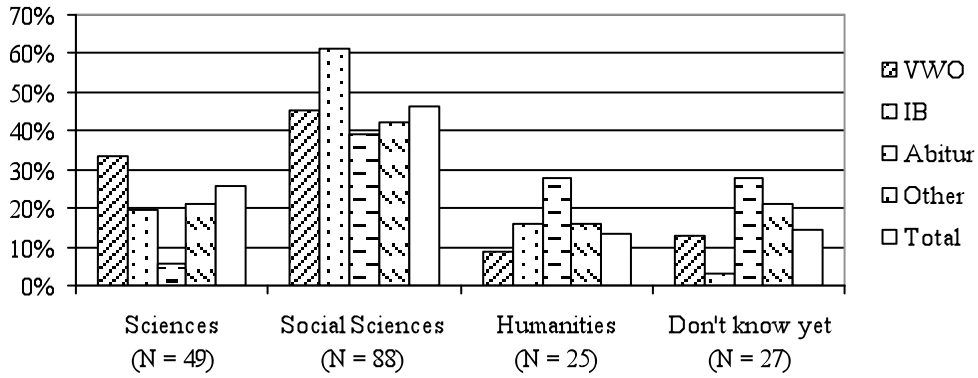
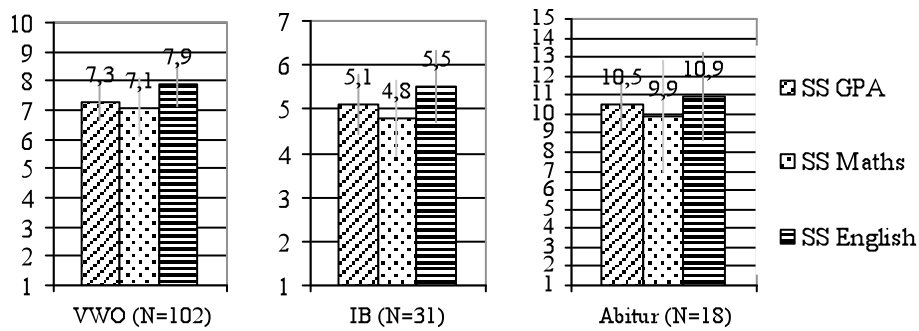


Figure A4. Preferred (intended) majors at the admission stage, distributed over secondary school background.

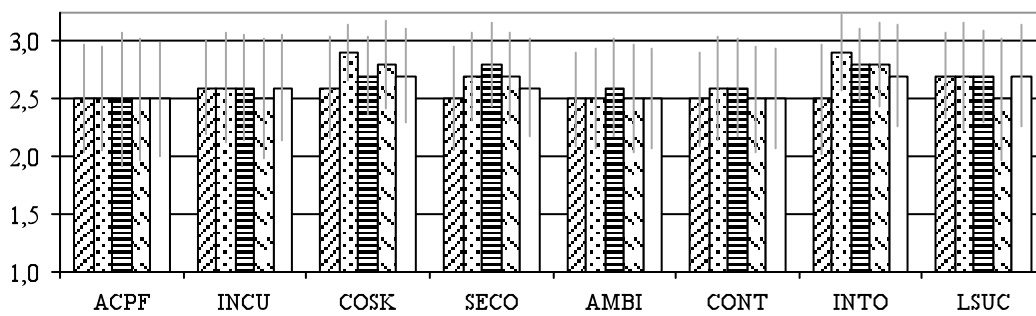


Standard deviations are displayed as vertical lines through the mean.

Figure A5a. Secondary school grades VWO.

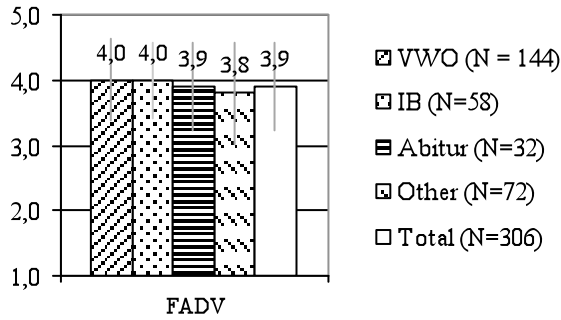
Figure A5b. Secondary school grades IB.

Figure A5c. Secondary school grades Abitur.



Standard deviations are displayed as vertical lines through the mean.

Figure A6a. Mean scores and standard deviations of the interview variables, distributed over secondary school background.



Standard deviations are displayed as vertical lines through the mean.

Figure A6b. Mean scores and standard deviations of the interviewer's Final Advice, distributed over secondary school background.

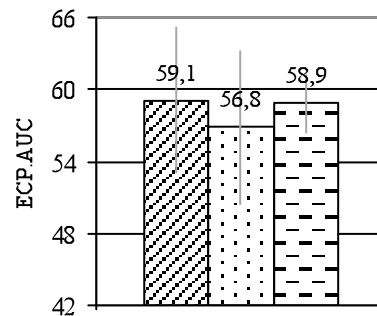
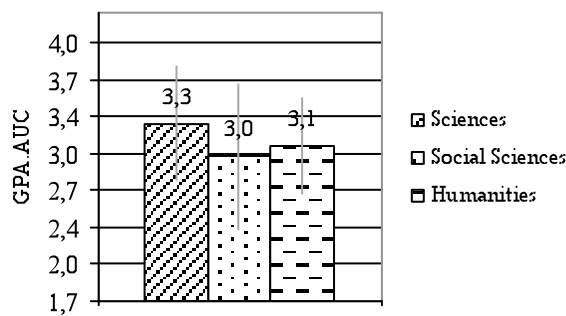
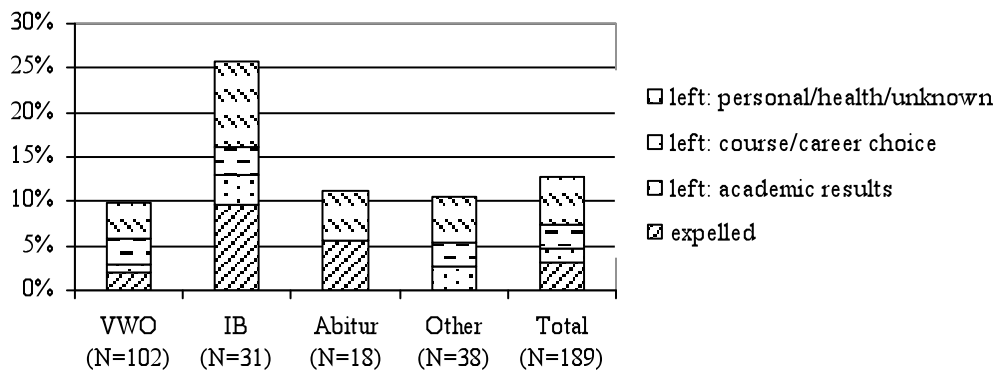


Figure A7a. AUC study results GPA of the first year, distributed over the majors.

Figure A7b. AUC study results ECP of the first year, distributed over the majors.



Note: percentages are of total number of secondary school group.

Figure A8. Exit reasons by secondary school background.

Appendix B. Tables.*Table A1a. Explained variance Multiple R² and Adjusted Multiple R² for different models of prediction of GPA and ECP for the VWO group.*

Predictive Model		GPA		ECP	
		<i>R</i> ²	<i>R</i> ² adj	<i>R</i> ²	<i>R</i> ² adj
<i>Simple</i>					
Model 0	SS GPA	.49	.49	.22	.21
Model 1	SS GPA, Maths, English	.50	.49	.26	.24
Model 2a	SS grades + course profile	.55	.51	.38	.32
Model 2b	SS grades + course profile + maths kind	.58	.52	.41	.33
Model 3a	SS grades* + interview FADV	.58	.52	.41	.33
Model 3b	SS grades* + interview ACPF	.58	.51	.41	.33
Model 3c	SS grades* + Factor 1	.58	.51	.41	.32
Model 3d	SS grades* + Factor 2	.61	.54	.41	.32
Model 3e	SS grades* + Factor 1+Factor 2	.61	.53	.41	.30
<i>Complex</i>					

Table A1b. Explained variance Multiple R² and Adjusted Multiple R² for different models of prediction of GPA and ECP for the IB group.

Predictive Model		GPA		ECP	
		<i>R</i> ²	<i>R</i> ² adj	<i>R</i> ²	<i>R</i> ² adj
<i>Simple</i>					
Model 0	SS GPA	.22	.18	.05	.00
Model 1	SS GPA, Maths, English	.29	.16	.07	-.10
Model 2a	SS grades + course profile	.41	.09	.35	.00
Model 2b	SS grades + course profile + maths kind	.61	.21	.56	.13
Model 3a	SS grades* + interview FADV	.62	.15	.57	.05
Model 3b	SS grades* + interview ACPF	.71	.35	.70	.34
Model 3c	SS grades* + Factor 1"	.71	.28	.70	.26
Model 3d	SS grades* + Factor 2	.61	.02	.58	-.05
Model 3e	SS grades* + Factor 1+Factor 2	.73	.11	.72	.08
<i>Complex</i>					

Table A1c. Explained variance Multiple R² and Adjusted Multiple R² for different models of prediction of GPA and ECP for the Abitur group.

Predictive Model		GPA		ECP	
		<i>R</i> ²	<i>R</i> ² adj	<i>R</i> ²	<i>R</i> ² adj
<i>Simple</i>					
Model 0	SS GPA	.34	.29	.09	.03
Model 1	SS GPA, Maths, English	.57	.46	.40	.24
Model 3a	SS grades* + interview FADV	.60	.44	.41	.17
Model 3b	SS grades* + interview ACPF	.58	.41	.43	.20
Model 3c	SS grades* +Factor 1	.63	.42	.56	.31
Model 3d	SS grades* + Factor 2	.79	.68	.69	.52
Model 3e	SS grades* + Factor 1+Factor 2	.81	.62	.77	.55
<i>Complex</i>					

¹ Christoffel Reumer is a researcher at AUC and a PhD student at the VU University Amsterdam. Marijk van der Wende is the Dean of AUC and Professor of Higher Education and PhD supervisor at the VU University Amsterdam.

² This refers to the Californian Masterplan (1960), which had as two underlying principles: higher education ought to be *accessible to all people*, regardless of their economic position, and function of higher education should be *differentiated* in three separate systems (i.e. the research universities granting degrees up to the doctoral level and carrying out research, the state universities granting degrees up to masters level, and the community colleges) that would *strive for excellence* in different areas to enhance efficiency. In this way, Clark Kerr, one of the principle architects of the Plan, expressed his goal to balance the competing demands of *fostering excellence* and *guaranteeing educational access for all*. The Californian Masterplan played an important role as a model for restructuring public higher education in the US and beyond (Rothblatt, 1992). In the Netherlands the Californian Model was already discussed in the 1980s as a model for reform (Rupp, 1997).

³ See: <http://www.u-map.eu/>

⁴ A "liberal arts" institution can be defined as a "college or university curriculum aimed at imparting general knowledge and developing general intellectual capacities, in contrast to a professional, vocational, or technical curriculum." (Encyclopedia Britannica). The Carnegie Classification identifies Baccalaureate Colleges - Liberal Arts as institutions that "are primarily undergraduate colleges with major emphasis on baccalaureate programs and which award at least half of their baccalaureate degrees in liberal arts fields" (Carnegie Foundation for the Advancement of Teaching website). The term "liberal arts" or "liberal education" is often used as a short hand for the more comprehensive term "liberal arts and sciences education", although it is explicitly recognized that the sciences have their integral place in that concept.

⁵ "Almost total" as there are certainly exceptions. Firstly of course the UK with a by and large selective system of admission to the universities, with stratified levels of admission and Oxbridge global brand name elite institutions (Tapper & Palfreyman, 2009). But also the Grandes Écoles in France, and other selective branches of European higher education like schools of fine and performing arts, hotel schools, business schools, some military academies, etc. For Germany a turning point seems to appear with the recent launch of its "excellence initiative", although this is mostly focusing on research (Kehm & Pasternack, 2009).

⁶ The term "university college" is used in the Netherlands for selective liberal arts colleges and is not to be confused with the use of the same term in some other countries (e.g. Norway or Belgium) as the international name for non-university type of institutions.

⁷ In addition, programs labeled as liberal arts were opened on Utrecht's main campus, in the University of Amsterdam and in Tilburg University in the same period (these can be considered as broader or less straightforward interpretations of the liberal arts college model, are not all taught in English and not necessarily residential).

⁸ Observations on the historical accuracy of this point vary. Douglass for instance argues that the big three were already discriminating before 1920 and did not simply base admissions on "academic criteria". A big share of Harvard's entering class before and after 1920 was based on alumni and family connections -- still does this today with about 20% or more children of alumni getting preferential treatment. But they stepped up considerably their attempt to keep out the undesirables in the 1920s by getting more info - like pictures of the applicants (Douglass, 2007: 50-55 and 257-258).

⁹ For example, see the following sources for a detail on criteria used for determining eligibility and then selection of student at UC Berkeley: <http://students.berkeley.edu/admissions/>

¹⁰ A new study indicates that at private elite colleges and universities in the US: "The relative advantage of being an alumni child has gone up rapidly in the last 20 years. In 2009, Princeton admitted 41.7 percent of "legacy" applicants (alumni children), 4.5 times the rate for non-legacies. In 1992, the legacy admit rate was only 2.8 times the rate for others" (<http://www.insidehighered.com/news/2010/09/22/legacy>).

¹¹ The specification "cumulative" does as such not contradict the Dutch findings on the predictive value of "final" GPA as the final grades in the Dutch system are a combination of cumulative GPA over the last three years of secondary education and the grades for school-based and national examinations.

¹² Such as the widely-used SAT (Scholastic Aptitude Test) in the USA.

¹³ VWO = *Voorbereidend Wetenschappelijk Onderwijs*, or University Preparatory Education, which takes six years and qualifies students for entry to university education. See For more information on the Dutch educational system, : <http://www.nuffic.nl/international-students/dutch-education/education-system>.

¹⁴ See: <http://www.auc.nl/acadprog/object.cfm/434F556F-1321-B0BE-A4EAC2FF829B908B>

¹⁵ For more information on AUC in general see: www.auc.nl. For details on its admission procedure and criteria see: <http://www.auc.nl/admissions/object.cfm/52555E6D-1321-B0BE-A49A96664670A64A>

¹⁶ For instance international and IB schools provide a detailed explanation of the individual student's score compared to the class average and the average of the school over a number of years. French testimonials give such a systematic comparison of the scores of pupils in relation to the class average and the deviation from the highest and lowest scores per class. Schools in the U.S. often show explicitly whether or not they grade to the curve. The information provided by the Dutch VWO schools is in comparison with these international examples extremely minimal.

¹⁷ Several cases occurred and were mostly related to serious illness of the student or (loss) of an immediate family member or an intensive sport or artistic career. Therefore substantially less time than normally available was spent on schoolwork and consequently grades were lower than under normal circumstances would have been expected.

¹⁸ See: <http://www.auc.nl/admissions/object.cfm/52555E6D-1321-B0BE-A49A96664670A64A>

¹⁹ Ibid.

²⁰ In Februari 2010, another 14 students joined. These students are not included in the analyses in this article, since they have not yet completed a full year of study at this point.

²¹ Inquiry at the most recent data show that a number of the Abitur students actually declared their major in the Sciences after the first year, levelling the proportions to some extent.

²² In the case the interview was carried out by two interviewers, the interview scores are averaged.

²³ Although '3' was the maximum score of the 3-points scale, some interviewers occasionally chose to give scores higher than 3, e.g. '3+', which was entered in the database as 3.25. Of course, this effects not only mean scores, but also the standard deviations.

²⁴ Study progress is mainly reflected in *ECP*, but partly also in *GPA*, because course failure is graded with grade point 0.0.

²⁵ Including credits earned in extra (fifth) courses.

²⁶ 6 students were excluded from the analyses for reason of temporary withdrawal (illness) and 9 out of 24 drop outs (see section on attrition) did so because of academic performance.

²⁷ For instance, De Gruyter et al. (2006) found a correlation of .58 between the Dutch secondary school GPA and the average grade in the first year of a psychology study and a correlation of .56 for a law study at Leiden University. In another study on the feasibility of selection in (particularly) medical studies in The Netherlands, the *Committee Drenth* (1997) speaks of the relation between secondary school and study success in the first bachelor year as being 'moderate', mentioning a correlation of .32. After the first year, this correlation drops to .10 towards the end of the study (6 years).