
July 3-5, 2017
Valley Lodge
Magaliesburg
South Africa

Editor: Janet Liebenberg
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Message from the Conference Chair

Welcome to the 46th Annual Conference of the South African Computer Lecturers’ Association (SACLA 2017). I trust that you will have an energizing and enlightening conference at Valley Lodge, Magaliesburg.

The goal of SACLA-conferences is to provide participants with an opportunity to share ideas, while maintaining a high level of academic input from all involved. You are encouraged to participate fully at the conference and to use the breaks and evenings to interact with colleagues from your own and other institutions.

The accepted papers reflect current trends in teaching and learning in Computer Science and Information Systems. This is in keeping with the theme of SACLA 2017, Keeping Education Relevant: Infinite possibilities.

We are fortunate to have an international keynote speaker from the USA, Grandon Gill. In addition, we have scheduled a workshop on ‘The South African Computing Accreditation Board (SACAB) – Implementation and Documentation’.

On behalf of the SACLA community, I wish to express our deepest appreciation to our sponsors, AdaptIT, IITPSA, IBM, Oracle and SAP.

A successful conference requires the effort of many individuals. We would like to thank the members of the program committee for their hard work. We are grateful to the authors who submitted their papers to this conference. I also wish to extend my sincere thanks to all members of the organising committee and congratulations for a job well done.

We hope that everyone will have a good time at Valley Lodge.

Estelle Taylor
SACLA 2017 Conference Chair
Message from the Program Committee Chair

It is with great pleasure that I compile the papers after an intense period of reviewing. I extend my thanks and appreciation to the reviewers who provided extensive and insightful reviews.

I commend the authors for meeting the deadlines that are so important for the smooth running of the process of submissions and review. I thank the authors for using this forum to share and participate in the event.

This year we received 63 papers for review. The program committee consisted of both local and international experts in the fields of Computer Science and Information Systems Education, with the necessary expertise and interest in subjects relevant to the theme of the conference. The program committee had 53 members, of which 30 were international members. Each paper was reviewed by 3 reviewers in a rigorous double-blind peer review process. The programme chairs solicited additional expert reviews in cases where further clarity was warranted. We accepted 40 papers of high quality for presentation at SACLA 2017. Before publishing a paper, authors had to include the corrections as stated by the peer reviewers. Of the 40 presented papers, 22 papers will be published in the Springer publication: Communications in Computer and Information Sciences and therefore, only the titles and short abstracts of these papers are included in this publication.

Thank you again to all our reviewers and authors. I am looking forward to meeting all of you at the conference.

Janet Liebenberg
SACLA 2017 PC Chair
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Students' Over-Estimation of Their Academic Ability: A Case Study in Undergraduate Computer Science

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Abstract. In this paper we show how a large cohort of second-year university students in Operating Systems repeatedly over-estimated their own abilities in tests of predictive self assessment. We conjecture that this persistent discrepancy between students' reality and their optimistically exaggerated self-image is symptomatic for the mass-participation in university education nowadays, and contributes considerably to the grievances notoriously experienced by many tertiary-level students and lecturers of Computer Science in these days. Awareness of this cognitive discrepancy typical of the upcoming generation might help us to mitigate at least a few of the academic problems from which difficult courses with persistently high failure rates, such as Operating Systems, are suffering in the mass-participation universities of nowadays.

Keywords: Computer science education, Academic performance, Struggling students, Self estimation, Improvement of preparedness.

"Know Yourself!"
– Oracle of Delphi

1 Introduction

'Success' of an academic institution as a whole is often measured on the basis of its students' pass rates, whereby it has often been argued that the standards of teaching and contents within a given curriculum play a vital role in those pass rates. For the purpose of this paper, however, we assume that the teaching and curriculum standards in our context are at least in principle acceptable, although the specific course (Operating Systems) which we investigated had a long track record of low pass rates since many years. This perceived difficulty of our course and its persistently high failure rate have motivated us to conduct our investigation.

The case study described and discussed in this paper is based on the presumption that above-mentioned difficulties are somehow 'connected' with a far-ranging 'transformation' of the whole society, including its entire academic system, since the late 19th century (until today). The 'classical' university of the 19th century catered for a very small proportion, namely the Bildungsbürgertum, of a country's population. This old situation is sketched qualitatively (without exact numbers) by the purple area in Figure 1; for quantitative details see [9][32]. Since the second half of the 20th century, and especially since the 1970s (after the wide-spread social movements of 1968), the number of study beginners at universities worldwide has been rising rapidly for a combination of both political and economic reasons:

- In the political sphere, social-democratic and left-wing welfare state ideas have been strongly on the rise across the globe, including their promises of equal opportunities for everybody, which fueled new ambitions amongst many capable and intelligent young members from the traditional working- and farming-classes.
- In the sphere of economics, advanced means and methods of production by automation have made many traditional crafts and jobs almost obsolete, in particular those ones for which low levels of education had been for centuries sufficient (e.g.: farm-hands, fishermen, wood choppers in the forests, and the like). To people from those kind of social backgrounds the massively automated economy can hardly offer any work opportunities any more, which threatens those people's livelihoods and forces them to seek new opportunities (through higher education) towards 'white-collar' jobs in indoor offices.

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Such 'rising of the masses' was already diagnosed around the year 1930 by the visionary Spanish philosopher and political intellectual José Ortega y Gasset [21][26]. However, due to the notorious Gauß'ian bell curve distribution of natural intelligence (see Figure 1) across the entire population of every nation [19], the only 'place' from where large masses of students can enter the 'new university' of the 21st century is the 'bulk' of the bell curve where the population's IQ levels are near-average, considerably below the level of exceptional scholarly excellence. This long-term development has some inevitable consequences:

- *If* the 'intellectual level' of tertiary education shall nowadays remain as high as it had been in the classical university of the 19th and early 20th century (purple spot in figure Figure 1), then the failure rates among students 'located' near the 'bulk' of the 'bell' must inevitably be high.
- *If*, on the other hand, high pass rates are politically and economically desired for the well-being of the contemporary welfare state, then the 'intellectual level' of nowadays tertiary education cannot remain as high and difficult any more as it had been in the 'classical' university.

In other words: the currently fashionable 'parlance' among many contemporary university managers (provosts, deans and rectors) about keeping up a high standard and at the same time having a high pass rate expresses politically (21st century) and academically (19th century) conflicting 'wishful thinking', where at best some semi-satisfying compromise somewhere on the middle ground between those two mutually exclusive extremes can be found; the 'law of the bell' is strict and does not leave much room for miracles. All this is particularly true for our inherently difficult discipline of Computer Science as well, with which large numbers of enrolled students can hardly cope, and for the *scientific-ness* of which the large majority of merely 'skill'-seeking students does no longer have any appreciation [17]. Even worse in this context, as recently confirmed by Suleman, is that large numbers of Computer Science students nowadays "do not read and do not wish to read" [29](p.92) any more.

Though it would be good to preserve some attributes of the 'classical' university, the reality of nowadays requires us to think innovatively, to adapt ourselves to our new environment, and to support as many as possible of the new generation of students for the sake of our contemporary society as a whole. The small case study, which we present in this paper, is an attempt at gaining some deeper understanding of this new reality. We want to characterise some of its interesting 'features' in order to be able to find (if possible) some reasonable 'middle
ground’ on which more students can improve their personal qualifications without the need for universities to substantially lower their institutional academic quality standards.

For the purpose of our investigation the context of it was carefully chosen. As mentioned above, since many generations of students our Operating Systems course (within which we have conducted our case study) has been dreaded and feared by many students as 'very difficult' (no matter by which individual lecturer with which particular textbook it had been taught over the years); see [25] for comparison. Word-of-mouth on campus, as well as student-written 'blogs' on the Internet, spread out the usual anecdotes, and since many years the course has appeared in the university's annual 'rank list' of those courses with uncomfortably high failure rates (alongside, for example: Inorganic Chemistry). Some particularly unfortunate students in Operating Systems needed several years of consecutive re-attempts before they eventually passed with mediocre marks. In many of those cases the failing students themselves were painfully 'surprised' by their failures, having (wrongly) believed for too long time that their own success would be almost guaranteed – according to a wide-spread belief that failing students are almost always "the other students", not "me". Our Operating Systems course, with its enrollment number of more than 350 students, was also large enough to 'lift' the significance of our findings at least a little bit above the level of mere 'anecdotal evidence'.

For lecturers and tutors of Computer Science at other universities the findings of our investigation should be reasonably interesting, because the persistent discrepancy between many students' exaggerated subjective self-image and their rather harsh objective reality in courses as difficult as Operating Systems [25] is a permanent source of grievance in contemporary academic (Computer Science) environments. The origins (or 'root causes') of those exaggerated self-images found among our students, however, are not included in the research scope of this paper any more: they are left to be investigated in 'future work'.

2 Related Work

According to Ghazvini, 'self-concept' is a multifaceted construct consisting of knowledge and attributes that people use to describe themselves [15]. Academic self-concept, self-esteem and self-efficacy are some of the prominent aspects of self-concept. Self-esteem is connected with social competence whilst self-efficacy is the belief in one's ability to carry out a given task or assignment successfully. It is generally accepted that self-efficacy improves students' achievements [4], which in turn bolsters both self-esteem and academic self-concept. Successful education is believed to be related to how effective an educator is in strengthening the self-efficacy of the learners [1][2].

Numerous studies have been conducted about people's insight into their own abilities [38], as well as about students' perception of self and what it does to their cognitive and psychological well-being [38]. In [6] it was found that the correlation between self-perceptions and performance was significantly higher among high-ability children than among low-ability children, which suggests that accurate academic self-concept is indicative of higher ability. Similar observations were described in [22][23], according to which bottom-quartile participants were nearly four times more 'mis-calibrated' than their top-quartile counterparts, and according to which top-quartile participants tended to underestimate their performance; see also [12][20] for comparison. This phenomenon was aphoristically expressed already by Bertrand Russell more than 60 years ago: "One of the painful things about our time is that those who feel certainty are stupid, and those with imagination and understanding are filled with doubt and indecision" [27].

Ghazvini also asserted that accurate academic self-concept predicts ability and performance in literature and mathematics [15]. Moreover it has been claimed that a healthy self-concept is valuable in any profession [28]. While it is essential for academic growth [5][31], there is on the other hand some danger in having an inflated or otherwise unrealistic perception of one's own ability, e.g.: pursuing careers for which one is objectively under-qualified [38]. In [10] it was postulated that, on average, people tend to believe that they themselves would be above average in skill; they are thus likely to reach judgments with too much confidence – a consequence that defies the laws of descriptive statistics. The authors of [10] point to the 'double curse' from which incompetent individuals have to suffer: their deficits cause them to make errors and also prevent them from gaining insight into their errors. The authors of that paper have expressed their hope that 'up-skilling' might help those unfortunate individuals to recognize the limitations of their abilities.

The inclination of people towards a heightened sense of egotism associated with over-estimation of their own abilities is believed to be more prevalent in the upcoming generations of nowadays than in previous generations of the not-so-distant past [35][37]. In related research by Twenge and Campbell [34][36] on survey responses provided by 37'000 college students, about =30% (per cent) of those students are reported to believe that they
'ought to' obtain good marks simply for paying their tuition fees – thereby not understanding (or not wanting to understand) that with tuition fees 'invested' into an 'education market' one can only 'buy' a learning-opportunity, not an actual learning-result. In [33], on the other hand, it was critically pointed out that case studies which generally confirm a universal rise of narcissism among the youth may not be statistically (or otherwise methodologically) sound.3

3 Investigation: Motivation and Design

Wise planning and dedication shown by a university student is often a catalyst for personal success [3]. However, how do we measure whether a student's amount of planning and dedication is sufficient for success? In order to guide our students to appreciate the value of effective time management we instructed them to read an article about time management on a website called 'Good Luck Exams' by Rebecca Ezekiel.4 We also encouraged our students to keep track of the time they spend (individually) on our course, and provided them with pre-designed personal time-tracking sheets (including items like 'background reading time', 'practical programming time', 'exam preparation time', and so on) for this purpose. We pointed out that, when they do this time-tracking exercise while being honest to themselves (i.e.: no cheating with hours and half-hours), the time-tracking sheet would help them to 'balance' their 'time budgets' more efficiently towards success. Our students were not compelled to complete and submit their time-tracking sheets. In order to 'encourage' voluntary participation, a 'lucky draw' was announced in which the (voluntary) submitters of those time-tracking sheets could possibly win a reasonably sized 'prize' at the end of the semester. However, in spite of the 'enticing' with a 'prize', our students' participation in the voluntary time-tracking exercise was insignificantly low and could, for this reason, not be evaluated. The remainder of this paper deals thus only with our students' self-perception in contrast to their actual academic 'performance'.

During the course our students had to write some semester tests. Each of the test papers consisted of two parts: one compulsory, one voluntary. The first (compulsory) part consisted of the usual questions and calculation tasks in the field of Operating Systems, whereas the second (voluntary) part asked for the students' contribution to our case study research. In that part, as shown in Figure 2, the students were asked to predict (or guess) their own results to be achieved in the various questions of the first (compulsory) part.

![Figure 2: Assessment of Students' Self-Estimation.](http://www.goodluckexams.com/8-steps-to-effective-time-management-for-students/)

The numbers of students, who participated in our case study, are listed in Table 1.

3 Elderly complaints about a perceived "decline of virtues" amongst "the youth" have been recorded in writing since the days of classical antiquity.
4 http://www.goodluckexams.com/8-steps-to-effective-time-management-for-students/
Table 1: Response Rates.

<table>
<thead>
<tr>
<th>Students</th>
<th>Test #1</th>
<th>Test #2</th>
</tr>
</thead>
<tbody>
<tr>
<td># Students registered for the Operating Systems course</td>
<td>370</td>
<td>356</td>
</tr>
<tr>
<td># Students who wrote the semester test</td>
<td>350</td>
<td>336</td>
</tr>
<tr>
<td># Students who voluntarily answered our research question (Part II)</td>
<td>146</td>
<td>129</td>
</tr>
</tbody>
</table>

4 Observations: Data and Evaluation

Many of our students turned out to be fairly indifferent towards our intentions and purposes. Some students, however, might have been influenced by our initiative. The following is a comment written by a (weak) student who did not participate in the estimation exercise (Part II) of the first semester test (Test #1): "I have no confidence in any of the answers provided above. Therefore, it would be hard for me to provide an estimation without making myself feel bad. Please do include this question in the following tests as I will be more confident". The student realized his shortage of understanding after writing the test, but was not yet prepared to ‘quantify’ it. This insight seemed to motivate him initially to be better prepared for the second semester test. However, this same student did then also not participate in the voluntary estimation exercise in the second semester test.

Another student, who did not attempt a detailed estimation per question, provided a rough ‘overall’ estimation for the test as a whole and voiced a similar self-reflection after the first semester test: "After writing this test I am disappointed in myself because I should have spent more time studying, but my estimation is that the mark I will get will be around 45%–50%". Also he was one of those students who grossly over-estimated their own actual results.

All in all, among the 325 students who wrote the final exam after the semester (whereby 55 of the students who were registered at the time of the first semester test had dropped out before the final exam) there were 177 participants, yielding a participation rate of ≈54%: see Figure 3. The same figure also shows that the final pass rate (after the exam) was notably higher among the interested participants (101 : (101+76)) than among the non-participants (56 : (56+92)). In other words: the on-average 'stronger' students were the ones who were on-average also more 'open-mined' towards voluntarily participating in the (potentially 'painful') self-estimation exercise. Not all participants participated in both self-estimation exercises: some participated only in the first one, some participated only in the second one.
Figure 3: Proportions of Students who were reached by our Investigation.

The self-estimation results from the first part of our investigation are displayed in Figure 4. The diagonal line in the figure separates the two sub-spaces of self-over-estimation from self-under-estimation. As it is shown by the black dots in the diagram, the large majority of participants strongly over-predicted their own performance (regardless of whether those participants actually failed or passed the Operating Systems test the outcome of which they had to predict). Only few participants predicted the result of the test more or less accurately, or even under-estimated their actual achievement. As shown by the pale-blue triangles in Figure 4, about half of those (few) students, who under-estimated their own ability, actually passed the written Operating Systems test. With a pass-score of 25 points for this specific test, the reader can easily 'extract' from Figure 4 the following four categories of participants in four 'quadrants' of the dot-space:

1. self-over-estimated and failed the test,
2. self-over-estimated but passed the test,
3. self-under-estimated but failed the test nevertheless,
4. self-under-estimated and passed the test.

All in all, Figure 4 shows clearly that most participants could be found in the first of the four categories.
In the second self-estimation exercise we had fewer participants than in the first one, as it can be seen from the 'sparser' distribution of dots in Figure 5. In spite of this being the second test (i.e.: at least the twice-participating students should have been able to remember their own prediction accuracy, or shortage thereof, from the previous self-estimation exercise), the image displayed by figure Figure 5 is qualitatively similar to the previous one: also in this second test, most participants came (again) into the 'over-estimate and fail' category.  

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During the semester it was thanks to the programming practicals, rather than those written tests, that many students of our course eventually obtained the entrance permit for the final exam after the semester.
Figure 5: With this second test's pass score of 15 points, most participants fell again into the category 'over-estimate and fail'.

The combined findings of the afore-mentioned two self-estimation exercises are depicted in Figure 6. It captures the results from only those (fewer) students who had participated in both of those self-assessment exercises. The figure shows clearly that the proportion of those participants, who under-estimated themselves twice, is only small. Some participants sometimes over- and sometimes under-estimated themselves (as it could also have happened in a random number game), but the overwhelming majority of participants over-estimated their capability in both subsequent exercises (possibly hoping that "next time everything will be much better", as weak students often say to console themselves).

Figure 6: Proportion of twice-participants who over-estimated their ability in both self-estimation exercises.
5 Discussion and Recommendations

Our (admittedly limited) case study highlights how most of our rather weak Computer Science students continuously over-estimated their own academic capabilities (even in spite of previous failure experiences) in an attitude that we may call 'stubborn optimism'. Such attitude seems to be a wonderful and life-serving privilege of the youth, though the phenomenon also occurs among older and higher-educated people; (for example: 94% of the academics surveyed by [8] believed to be 'above average' in their professional qualities).

Our findings support those of [13] whereby in 68% of cases the surveyed students gave themselves higher marks than they would have obtained from their educators. Our observations are also 'in line' with [18] whereby better students were able to make more accurate predictions as their semester went on, whilst poorly performing students remained over-confident all the time in spite of the feedback they had received on earlier exams. These and similar phenomena have become notorious under the label of the Dunning-Kruger effect, in which mediocre individuals suffer from illusory superiority, mistakenly assessing their ability as much higher than it really is, whereas highly competent individuals are more inclined to underestimate their relative competence (and may erroneously assume that tasks, which are easy for them, would also be easy for others). In that context Dunning and Kruger postulated that the ‘mis-calibration’ of the incompetent would stem from an error about the self, whereas the ‘mis-calibration’ of the highly competent would stem from an error about others; recall for comparison Bertrand Russell’s well-known aphorism. In spite of the ‘alignment’ of our findings with the above-mentioned related work, we must point out that we have made our observations in only one course, in only one specific university, in only one specific academic year, in only one specific sub-discipline of the ACM Computer Science curriculum. Hence we cannot ‘universalise’ our results. Nevertheless it seems reasonably justifiable to provide, at the end of this paper, at least the following few tentative ‘recommendations’ as ‘lessons learned’ for our future practice:

5.1 Recommendations to University Students

According to our findings, (too) many students are naively unaware of their inability to cope with the academic expectations in Computer Science. Self-awareness, however, can be improved by ‘training’ like any other ‘skill’ can be trained. Hence we suggest that students should consciously work on their self-knowledge by regular (perhaps weekly) 'reflections' about their own level of preparedness, with the goal of being able to identify feasible actions by means of which their preparedness could be enhanced. Self-awareness could be increased by any interested student, for example, along the lines of some of the following simple self-consultation questions which are motivated by the classical Delphic maxim [24] of "know yourself":

- Did I take a similar course already before university, in secondary school?
- Do I anticipate to fare similarly well for the university courses I need to take, and, if I believe so, then what is my basis of such belief? Is my belief based on real experiences?
- How does the curriculum at university differ from the similar course(s) I took during secondary school, and what might be the consequences of such differences?
- How do the methods of education at university differ from the methods of education at secondary school?
- Am I still ‘learning’ like an externally ‘instructed’ school pupil, or am I already ‘studying’ autonomously like a university student?
- How must my individual and social habits and status change due to my transition from secondary school to university?
- Whom could I possibly ask for advice if I am 'first-generation academic' and my family is not comfortably 'embedded' into the already well-educated social class of the Bildungsbürger?

5.2 Recommendations to University Lecturers

The above-mentioned preparedness problem, including the observed discrepancy between the students' self-image and their external reality, may be due to the challenges that students face when making their transition from secondary school to university. Such challenges include (but are not limited to) the following points:

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7 "The fundamental cause of the trouble is that in the modern world the stupid are cocksure while the intelligent are full of doubt”, http://en.wikiquote.org/wiki/Bertrand_Russell
• Students suddenly find themselves in a different, more mature and less restricted environment in which they have more freedom to do what they want (as opposed to being in secondary school). In this new environment, students often do not know how to 'handle' their new freedom and are thus easily distracted by the many other pastime possibilities which the modern life-style is offering to them. Particularly to some students who come to university out of remote, secluded, 'close-knit', isolated sectors of society, the sudden exposure to so many different opinions and so many different 'walks of life' at university may even amount to a veritable 'culture shock'.

• Students typically 'learn' new concepts from a starting position of narrow and restricted viewpoints. Thus believing to have already understand the newly learned concept fully and comprehensively, they find out only during the perusal of an already written test or exam paper that they did not actually understand the concept correctly because the wider 'context' of the newly learned concept was not properly taken into account. The lecturers, on the other hand, often forget that their own perception of the taught concepts is already standing on a much broader context basis; hence the lecturers are often surprised by their students' apparent 'narrow-mindedness' – see [14] for comparison.

Hence, lecturers ought to take note more 'proactively' of the magnitude of the problem that students have with the above-mentioned discrepancy between self-perception and external reality. Consequently, lecturers might help their students along the lines of the following recommendations:

• Motivate students by fostering onto them a positive attitude towards successfully completing their university courses and degrees. This can be accomplished with motivational lectures at the beginning of a course, or during the usual 'orientation days' at the beginning of a semester. These lectures should especially refer to the 'generational changes' and their implications for contemporary students to be able to live up to the expectation posed by the university.

• Intervene again and again during a course in order to take remedial actions proactively (rather than reactively), alert students frequently about their risks, and rectify the students' own misconceptions as soon as you become aware of them, even if such 'interventions' might be perceived as a tedious, time-consuming distractions from 'getting through' your course's mandatory syllabus.

5.3 Recommendations to Teachers at Secondary Schools

Secondary schools before university are currently not doing enough to prepare their pupils for the kind of freedom which is going to await them at university. School teachers should already before university begin to treat their older pupils in 'university style', by taking (amongst others) the following points into account:

• The transition from secondary school to university is often 'large', and secondary school pupils are often found un-prepared for it. School teachers should thus liaise with universities more systematically to organise information and preparation seminars for secondary school pupils well in advance. The pupils must receive early warnings from their teachers about the high likelihood of failure at their next higher level of education: 'excellent' school pupils are likely to be merely 'good' at university, and 'good' school pupils are likely to become merely 'copers' or 'strugglers' at university.

• One reason of the transition from secondary school to university often being so 'large' is the notable difference in 'standard' from subjects taught before and at university. In South Africa, in particular, this dilemma is exacerbated by low pass thresholds in secondary schools. For example, we are aware of cases in which mathematics exams at South African secondary schools were considered as 'passed' with merely 30% (per cent) of its tasks being solved. Such a 'standard' instills in pupils already at a young age the damaging misconception that a 30% achievement would be 'good' or, more generally speaking, that mediocrity would be acceptable. With such an attitude, however, failure at university will follow soon.

• School teachers should also train their pupils in 'information retrieval' and should encourage them to use school libraries or public municipal libraries as frequently as possible by their own initiative. This is because the specific problems (insufficient self-awareness) discussed above in our paper are often connected with the problem of too 'narrow' world-views in general, which can be mitigated by 'far-ranging' eclectic leisure-time reading on various topics. Recommendable topics for pupils' leisure-time reading (outside the school's mandatory curriculum) are high-quality youth-books which illustrate (in an entertaining manner) to their young readers the typical problems of youth (e.g.: troubles with school, generational conflicts: young versus old, conflict resolution, and the like), and which at the same time can also improve the pupils' often sub-acceptably low language proficiency in reading and oral articulation.
Conclusion and Future Work

Our paper described and discussed the problem of university students who are only insufficiently able to estimate how they would fare in certain university courses, in our case: a 2nd-year course from the 'core' of the Computer Science (and Computer Engineering) curriculum [30]. In good agreement with previously published work (see: 'Dunning-Kruger effect') on this problem we found that especially the weak students tend to overestimate very strongly their ability to do well in the university course we examined.

Although our case study had some 'quantitative' elements in it, it yielded by-and-large a 'qualitative impression' result which is still in need of further methodological consolidation and statistical corroboration, also including a solid analysis of significance versus spurious-ness [7](sect. 14.4). To-date our findings might still be regarded as 'anecdotal evidence', because merely one course in one academic year was in the focus of our investigation. Nevertheless we can find a number of methodological hints and guidelines in papers like [11] and [16] along the lines of which it should be possible to strengthen the trustworthiness of our preliminary empirical findings as well as the plausibility of our preliminary theoretical conjectures in the not-too-far future.

Moreover, some kind of weighted scoring 'model' might also be developed by means of which a student's self-assessment ability could be 'measured' (quantitatively) with sufficient reliability. Such measurements could then perhaps also be helpful for the purpose of 'guiding' particularly the weak students through their curricula at university.

Last but not least: suitable 'knowledge transfer' within the universities, as well as from the universities 'back' into the secondary schools (from where our young students are coming), might be able to mitigate (at least to some extent) this problem of the 'Generation Me' which our paper has addressed.

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REFERENCES


