Schola Europaea

Office of the Secretary-General

European Baccalaureate Unit

Ref.: 2016-09-D-23-en-2

Report of the Chairman of the 2016 European Baccalaureate Examining Board

BOARD OF GOVERNORS

Meeting of 7, 8 & 9 December 2016 – OSGES in Brussels

REPORT OF THE CHAIRMAN OF THE 2016 EUROPEAN BACCALAUREATE EXAMINING BOARD

August, 2016

Carl Winsløw*

Professor (Didactics of Mathematics)

University of Copenhagen, Denmark

winslow@ind.ku.dk

A report is a poem with no pictures

(definitely not Horace)

* A short CV is included in Appendix 1

INTRODUCTION

The institution of the *Schola Europaea* was born along with the European Economic Community, as it was formally set up in 1957, the year the Rome treaty was signed. The original purpose of the European School (ES) system, which continues to be its most important function, is to provide primary and secondary education to children whose families reside abroad in order to work at the European institutions.

The ES system does not impress by its size, with only 14 schools, catering to about 26000 students. Even when adding to this the 12 accredited European schools, the size of the ES system is very modest, compared to most national school systems. What makes the ES system unique is the multilingual and supra-national setup. The *multilingual* structure consists in *language sections* that allow most students to be taught in their mother tongue. This, then, necessitates the recruitment of teachers with a variety of national backgrounds. Of course, the students themselves come from all over Europe, and have often had a part of their schooling in their country of origin. This makes any of the European schools a "cultural and educational melting pot", which in itself can be said to be an important asset of the education it provides to its students; and unlike most "international schools" that exist around the world, the students are not simply taught in one dominant language. The *supra-national* character of the ES system lies with the principle of a *common curriculum* which is not the copy of any national school curriculum but which is built and developed specifically for the system. The management and uniform maintenance of such a supra-national school system evidently requires a specific and independent structure of government and financing, supported by the participating national states. In the European tradition, the government structure has both an administrative (Brussels based) basis and a more political (national inspectors and representatives) "government", the latter being led by a principal of annual rotation of the *presidency* of the European schools.

Altogether, the ES system can be seen, from an educators' point of view, as a fascinating and unique "anthropological laboratory" where national traditions and methods of education are continuously brought together. They are not simply mixed, but instead they are to generate a new and more or less independent School institution. Of course, this is the ideal. But in fact, the system would not be able to work unless everyone (students, teachers, managers) who enter the system, is willing to acquire its specific principles, and to put aside what is "taken for granted" in the national School they have known before.

This is in particular the challenge, every year, for the Chairman of the Baccalaureate Examining Board of the ES. This person is a university professor appointed by the competent authority (typically, the Ministry of Education) in the country which assures the Presidency of the ES in the given year. The Chairman is thus replaced every year. Coming from the tertiary sector and having (typically) no prior knowledge of the ES system, a significant part of the assignment is to become familiar with all aspects of the ES system and in particular the Baccalaureate. The Chairman is the final authority when it comes to

this exam, assisted by Vice-chairmen (a function held by the national inspectors). At the end of his term, the Chairman delivers a report to the ES Board of Governors, sharing observations and recommendations suggested by his experiences, primarily with the Baccalaureate, but also more generally with the school system that produces this diploma.

Evidently, producing a reasonably helpful report then requires a steep learning curve and some professional familiarity with secondary education at an international level. As for the latter, my main activity as professor of didactics of mathematics (Appendix 1) should at least give partial satisfaction. As for the first, I will let the reader judge from this report, knowing that people intimately familiar with the ES system will no doubt find signs of novitiate here and there. It may go without saying, but the present report is not to be construed as a systematic study or "audit" of the ES baccalaureate; for this, I have had neither the general capacity, in particular on subject matter, nor the time (a total of about 40 days of work, much of which went into becoming familiar with the system, travelling between schools and meetings, and so on). The present text is thus to be read as a personal reflection on limited observations, based on my professional background.

My report is structured as follows:

1. Method (p. 4)
2. Governance, regulations and administration (p. 5)
3. Curriculum and syllabi (p. 7)
4. Teaching and teacher development (p. 9)
5. The Prebac and its role (p. 11)
6. The written Bac examinations (p. 13)
7. The oral Bac examinations (p. 15)
8. The weight of internal assessment (p. 17)
9. Summary of recommendations (p. 18)

To close this introduction, I would like to take the opportunity to thank all the professional and friendly people from ES system that I have had the chance to meet during the past year. First of all, the Danish inspector and 2016 President of the Inspectors' Board, Mr. Lars Damkjær, has been an indispensable resource and help all the way, from meetings in Copenhagen and Brussels to school visits and proclamations around Europe. Next, I thank the management and staff of the ES HQ in Brussels for their insights and support at numerous occasions during the year, in particular Mr. Kivinen (Secretary General), Mr. Marcheggiano (Dept. Secretary General), Mr. Bordoy (Head of the Baccalaureate Unit), as well as Mrs. Dispenza, Mrs. Kopilova and other colleagues from the Baccalaureate Unit. Finally, at all the schools visited (see Sec. 1), we were invariably met with great friendliness by the management (Director and Deputy Directors), who devoted their time for in-depth meetings on issues raised by us or them, as well as by the teachers whose teaching and examinations we observed. I am deeply grateful for their openness and frank sharing of their knowledge, experiences and viewpoints.

1. METHOD

What follows is based on a number of *actions* undertaken during the past year. I summarize these briefly, indicating the sections to which each action has contributed.

Action	**Time**	**Sections**
Desktop study of Regulatory framework of ES/BAC and other documents relating to the ES	The whole year	2, 8
Attended Meeting of Board of Sec. Inspectors	Oct. 6, 2015	2, 3, 6
Desktop study of Syllabi for S5-S7	Oct.'15,Jan.'16	3, 4
First Meetings with SG, Dept SG and Bac Unit Hd	Nov. 27, 2015	All
Inspection of PREBAC, ES Frankfurt	Jan. 19, 2016	2, 5
Observation of lessons, ES Frankfurt	Jan. 19, 2016	4
Meetings with School Management, ES Frankfurt	Jan. 19, 2016	4, 5
Meeting with School Management, Accr. ES Manosque	Jan. 20, 2016	2, 4, 5
Meeting with School Management, Accr. ES Manosque	Jan. 21, 2016	3, 4, 5
Inspection of PREBAC, Accredited ES Manosque	Jan. 21, 2016	2, 5
Observation of lessons, Accr. ES Manosque	Jan. 21, 2016	4
Inspection of PREBAC, ES Brux III	Jan. 22, 2016	2, 5
Meetings with School Management, ES Brux III	Jan. 22, 2016	4, 5
Observation of lessons, ES Brux III	Jan. 22, 2016	4
Treatment of 1 complaint related to the Prebac	March, 2016	2, 5
Desktop study of select exam papers	May 2016	3, 6
Assisting the BAC unit with setting up external audit of exam papers, before (math) and after (biology) the exams	May+June 2016	3, 6
Decided on applications for deferred examinations, conditions by individual students, assisted by the Office)	May+June 2016	2,3,6
Inspection of BAC written exams, ES Brux III	May 30, 2016	6
Meeting with School Management, ES Brux III	May 30, 2016	4, 6
Meeting with School Management, ES Brux II	June 6, 2016	4, 5, 6
Inspection of BAC written exams, ES Brux II	June 6, 2016	7
Attended Meeting of Board of Sec. Inspectors	June 13, 2016	2, 6, 7
Inspection of 6 BAC oral exams, ES München	June 23, 2016	7
Meetings with School Management, ES München	June 23, 2016	2
Inspection of 5 BAC oral exams, Accr. ES Bad Vilbel	June 28, 2016	7
Meeting with School Management, Accr. ES Bad Vilbel	June 28, 2016	2, 4, 5, 7
Inspection of 5 BAC oral exams, ES Karlsruhe	June 29, 2016	7
Meetings with School Management, ES Karlsruhe	June 29, 2016	2, 4, 5, 7
Inspection of 4 BAC oral exams, ES Brux I	June 30, 2016	7
Meeting with Deputy Director, ES Brux I	June 30, 2016	2, 5, 7
Proclamation with speech, ES Brux III	July 1, 2016	-
Proclamation with speech, ES Brux I	July 1, 2016	-
Proclamation with speech, ES Luxembourg I	July 2, 2016	-
Treatment of a total of 16 complaints (strongly supported by the Bac Unit)	July, 2016	2, 3, 5, 6, 7

Except for the proclamation ceremonies which were impressive, but mainly festive events, I took notes from each of the above activities, leading to both questions and emerging

hypotheses about needs for reform or at least reconsidering certain regulations, practices or support measures. Progressively, the themes emerged which are treated in each of the seven following sections. Some of my reflections have remained questions with only a vague hypothesis (which may then be investigated further by the BAC unit and/or subsequent presidents), while for others I have formed relatively strong hypotheses which I then present as recommendations. In the few cases where they are related to my own specialties (in mathematics education and teacher development), I have supplied literature references to support the recommendation and potentially its implementation.

2. GOVERNANCE, REGULATIONS AND ADMINISTRATION

The governance structure of the ES system appears somewhat complicated, and reflects the supra-national character of the system (much, in fact, as the European Union institutions). Besides the local school managements, the ES system has central politico-pedagogical and administrative superstructures, which replace what in a national school system would typically reside in a Ministry of Education (with specialized offices, inspectors etc.). Although it has taken me considerable time to figure out how the different units, committees and management layers relate and refer to each other, I will not expose the details here as I might reveal some mistakes and as they will anyway be more familiar to likely readers of the report.

As for the overall functioning of the governance structure, I will only point out one general impression from several meetings with agents of the ES system. It appears to me that the politico-pedagogical level of the system is indeed highly professional and represents a variety of competences and interests, including those of parents, teachers, and partner countries; but at the same time that the system as a whole carries considerable inertia when it comes to both making and implementing decisions.

This could be seen as both positive (sudden, detrimental changes are prevented) and as negative (necessary decisions are taken too late or cannot be taken at all). It is not my task or within my capacities to locate the organizational features or procedures which are at the root of this phenomenon, or to advice on the governance structure of the ES system. Most likely it is difficult to change and its complexity may reflect political necessities of bodies in which compromises have to be made among many national systems. Nevertheless, I suggest that the Board of Governors undertake a renewed reflection on whether the current decision procedures could be made more efficient (in particular, more rapid and perhaps also less costly), to avoid that the ES system drifts behind important and natural developments in educational systems at large.

The most serious example of this risk, which I encountered early in my term as Chairman, is the costly, lengthy and ultimately vain efforts which have been undertaken to revise the syllabi for the natural sciences and mathematics at the secondary level (some of which

were last revised 20 years ago). Only slight, insufficient changes have been achieved in parts of the syllabi (including mathematics). Everyone acknowledge the need to bring them in tune both with the ES system's own principles, and with the recent developments in these subjects in the rest of Europe (not least piloted by the European Commission's own initiatives "Science in Society" (FP7), SWAFS (H2020) etc.).

Another example is the slowness with which the ES system is (partially) adopting new technology for the handling of exam documents (exam papers, student copies, marking sheets etc.). In fact, the ES system with its distant schools is an excellent case for implementing such technology, to avoid costly meetings of correctors in Brussels, risky postal distributions of exam papers in brown envelopes, etc.

As most readers will know, during 2016, progress was made on both cases: a call for tender was issued, seeking external experts who can draft proposals for new syllabi for the science subjects and mathematics. Also, a first digitalization of the correction of the written exams will be implemented in 2017. But it is evident that these decisions could and should have been taken before.

The Inspectors play several crucial roles in the ES system and in particular in relation to the Baccalaureate. Each inspector is responsible for one or more disciplines - and, for these, leads the formulation of exam papers and the correction process, oversees formulation of oral questions (in principle), etc. The inspectors, however, are not systematically selected by the national ministries in view of their competences in particular disciplines (although they must have some), while language subjects (L1, L2 etc.) usually are under the responsibility of a native speaker of that language. As a result of this, and of the multitude of languages which are taught (and may even have sections) at the ES, very few inspectors remain available and competent for major disciplines such as mathematics, which is taught to all students in every section at every ES.

In fact, in 2016, one single inspector is *solely* responsible for *both* mathematics and physics - not only for the baccalaureate exams (written and oral questions in all languages of the ES) but also for the teaching in all seven years of the secondary level, year round (inspection of classes at 26 schools, in service education of all the teachers of these disciplines, etc.).

This situation is clearly unacceptable, and it appears necessary to ensure that the composition of the inspectorate becomes more adequate, to ensure at least one academically competent inspector in each major subject. In large volume (and all sections) subjects like mathematics, one may even consider to assign two or three inspectors, some of whom could then have minor responsibilities such as a small L1 on the side. For both primary and secondary school, each member state furnishes one inspector, with a minimum of 40% of a full time position allocated to the task. The body of inspectors should thus be sufficient in number to ensure a sufficient spread on levels and subjects. Of course, the appointment of inspectors is at the discretion of national governments, but the

Board of Governors should be able to negotiate a procedure of appointment which ensures that the actual needs of the ES system are satisfied, and continue to be satisfied when new inspectors are appointed.

At the level of regulations, it is only natural that a newcomer (like the incumbent *président du bac*) can be a little overwhelmed by documents such as the 71 page "Arrangements for implementing the Regulations for the European Baccalaureate" (2015-05-D-12-en-1). On the other hand, the regulations are remarkably clear, well-structured and with hardly any repetitions. It is evident that a high level of explicitness is required in any high stakes examination system, and even more so when it also comes to a context where the agents originate from different national systems (each of which are, naturally, different from the ES system). Some efforts are deployed to communicate the rules more directly and selectively to those who need to know them; for instance, the student version of the regulations, or "guide for EB candidates" (2016-05-D-14-en-1) only take up about 30 pages and appears very helpful. Similar efforts of communicating the regulations could be undertaken also in relation to other groups, to ensure that rules are known and followed by those who should apply them. This may be particularly important when it comes to the correction of the oral and written exams (Sec. 6+7). Here, it must be remembered that given the practice of fixed term appointments, there will always be a relatively high percentage of teachers and other agents (such as correctors) who are "new" to the system. Of course, the communication effort is particularly important when new rules or procedures are to be implemented; but even existing regulations need to be more thoroughly disseminated and enforced. When it comes to exam regulations, the ongoing digitalization could be used to ensure the following of some rules which are currently dependent on the manual completion and checking of paperwork.

As far as my experience and observations can go in this matter, the administration of the ES system, and in particularly of the baccalaureate, is extremely efficient. This is true both at the level of the individual schools (where it is usually overseen by a Deputy Director) and at the central level (where I have mostly interacted with the Bac Unit, led by Mr. Bordoy). Given the complex procedures, staff and teachers from many different countries, and the high stakes character of the baccalaureate, the smoothness with which it has taken place is very impressive.

3. CURRICULUM AND SYLLABI

Creating and maintaining an independent, supra-national and still (across sections) relatively homogeneous curriculum, represents in itself a very difficult undertaking. Keeping it up-to-date with developments in the European society - including national schools and institutions of higher education - makes the task even more daunting.

Here, we use a common definition of *curriculum* as "the knowledge and skills students are expected to learn, which includes the *learning standards* or *learning objectives* they are

expected to meet; the units and lessons that teachers teach; the assignments and projects given to students; the books, materials, videos, presentations, and readings used in a course; and the tests, *assessments*, and other methods used to evaluate student learning" (http://edglossary.org/curriculum/). In the ES, strict homogeneity is not sought for to the level of "units and lessons that teachers teach" or even "the assignments and projects given to students". This is consistent with the fact that only a part of the assessment is centralized (namely, the final written exams and, to a lesser extent, the questions for the oral exams), while most of the assessment is managed locally at schools. Still, it is clear that having centralized exams and an ambition that the European Baccalaureate represents a well-defined and recognizable achievement, some level of homogeneity is necessary and is already reflected by the syllabi (or, with a somewhat more modern and comprehensive term, the *learning objectives*).

When studying the syllabi for different courses in ES system, also historically, it becomes clear that much has been achieved in some areas, especially regarding language policy, homogenization of language courses and other parts of the humanities. In other subjects, particularly mathematics and the natural sciences, one finds an astonishing focus on procedures and content areas (in themselves not very different from what is taught in national curricula), and a similar absence of emphasis on competences such as problem solving, independent reasoning and non-trivial modelling. The content part of the syllabi is by and large adequate and precisely described, but the lack of emphasis of more advanced kinds of competence may lead to a curriculum which is overly focused on training a (possibly large and demanding) array of standard techniques. These indeed dominate both in written and oral exams (cf. Sections 5-7). As already noted, efforts of revision of the syllabi for mathematics and science were unsuccessful for a long period, but have lately taken a new turn with the call for external specialists to carry out the task.

Without going into detailed recommendations for this specific work, soon to be carried out, I wish to stress the following overall observations and recommendations:

- A curriculum (including syllabi) for an ambitious school system like the ES, cannot be achieved "once and for all". Thus, mechanisms for ensuring regular reviews and updates - at least every 5 years - need to be put in place, concerning both the syllabi/learning goals, and relevant shared support materials (texts, lesson plans, assessment instruments, assessment outcomes).
- Even if the curriculum needs to be managed, in the day-to-day business, by teachers and competent inspectors (cf. Sec. 2), it is necessary - at least in the natural sciences and mathematics - to require that the reviews mentioned above are done by external and independent audits, carried out by university experts in the teaching of these disciplines. These disciplines develop rapidly in society and school, as does research and policies on their teaching.
- Concretely, this could be done by the Secretary General setting up independent expert panels in the main subjects (or clusters of strongly related subjects), with

competences and background from at least two national contexts in Europe. The competent inspector should of course interact closely with this panel but should not directly appoint it, and the panel should retain an independent function to ensure the necessary external quality control (cf. also Sec. 6-7).

- These expert panels could also, where judged necessary, be used to perform yearly external audits of the centralized exam papers, and suggest improvements of these, naturally in consideration of the learning goals in force.

The above would imply a considerable strengthening of the proposal for “External Auditing” recently discussed by the Board of Secondary Inspectors (2015-09-D-21-en-2).

In the absence of firm measures to support and monitor the ongoing development of curricula, drawing on external and research based expertise, there is a real (and to some extent observable) risk - pointed out by several of my predecessors - that the ES system develops into a closed circuit. In the end, it would then not live up to the requirements of present-day society and education. Therefore, it should be a key priority to counteract the current tendencies (at least in some subjects) towards an increasingly petrified and routine oriented course of study. For obvious reasons, and unlike some other systems of “international” schools, it is neither possible nor desirable to simply link the ES curricula to one particular national system; this would, indeed, amount to discard an essential principle of the ES system. Developing and maintaining an independent, ambitious and up-to-date curriculum will therefore have to be more strongly and efficiently prioritized.

4. TEACHING AND TEACHER DEVELOPMENT

While visiting schools, I had the chance to observe teaching in a variety of subjects (physics, mathematics, languages), and also to talk to a number of teachers, both after lessons and in other contexts. Teachers readily and even happily opened their classrooms to me as an external observer, and I naturally experienced both very successful teaching units, where all students visibly engaged with material and made progress, and a few units where for one reason or another, little more than a routine activity or even detached attendance could be observed among the students.

While the sample of teaching observed was admittedly small, the following observations and hypotheses appear to be worthy of further scrutiny:

- Teachers are generally carefully selected among experienced teachers at similar levels in their home country, and find some support for their teaching at ES in syllabi and shared teaching materials; but they otherwise largely adapt to the system on their own.

- A special situation exists for locally hired teachers (teachers who are not sent out by a national authority), who sometimes experience that they do the same work as seconded colleagues but are not considered or treated at the same level as them.
- Towards the end of a fixed term, some seconded and locally hired teachers feel they need more support to sustain their engagement at the school and, at the same time, prepare their next career step (as it is not always possible to prolong a contract).
- Especially at accredited schools, but sometimes also at larger schools, opportunities to interact with inspectors and with colleagues teaching the same subjects remain informal and insufficient. Possibly it will be necessary to make special arrangements to ensure that new measures of teacher development also get implemented in accredited schools.
- While recent efforts of "homogenization" of the Prebac has led to much welcomed occasions for collaboration among subject teachers across sections, this is largely confined to the level of S7 and does not suffice to create a "departmental practice" within subjects and across sections.
- Inspectors, especially those in charge of subjects with many teachers, cannot possibly ensure by themselves an adequate induction of new teachers, and even less an ongoing, subject-matter specific effort of in-service education.

In fact, policy-makers tend to overestimate what "external" interventions can achieve for the ongoing, practice oriented development of teaching (and teachers). Fortunately, individual schools and even more the ES system as a whole, holds considerable potential for teacher-driven development, if properly organized and encouraged by the schools. This is not least due to the vast variety of experiences and backgrounds of the teachers.

As in many other Western schools, ES teachers often find their daily activity pretty solitary; some do a great job and capitalize on their personal experience, while others resort to regressive techniques of coping with (sometimes conflicting) demands of students, parents and authorities. To achieve a more collegial and progressive approach to teaching, working formats of the "lesson study" type hold a significant potential for developing teaching in the ES system.

In short, lesson study requires schools to schedule periods where a group of teachers can observe lessons of colleagues, as well as separate meeting time for developing and reflecting on these specific lessons (see, for instance, Stigler and Hiebert, *The Teaching Gap*, The Free Press, 1999). Giving teachers the opportunities to engage in such collective activities, occasionally with visiting colleagues and "knowledgeable others" from outside, is a well proven, cost-efficient method to further the development of individual teachers, schools and indeed entire educational systems (cf. e.g. Dudley, *Lesson Study, a Handbook*, 2014; available online at http://lessonstudy.co.uk/wp-content/uploads/2012/03/new-handbook-revisedMay14.pdf).

5. THE PREBAC AND ITS ROLE

My first observation of school based activity took place at the time of the Prebac, which is essentially a series of written exams held in the last two weeks of January (exceptions are mentioned in 2015-05-D-12-en-1, p. 15). These exams are carried out much as the written exams of the Baccalaureate itself (held in May and June), except that

- the preparation and grading of exam papers is completely internal to the individual school, with the same exam papers used for all students in a given subject, across language sections (naturally, with translation where relevant);
- the papers only assess the part of the syllabi which has been covered up to and including the first semester of S7 (this, then, is harmonized at school level).

The inspectors have access to these papers but it is widely considered that they do not have time to monitor all exam questions (different for each school). It is thus fair to say that the Prebac is essentially managed at the level of the school. The marks from the Prebac contribute 30% of the final note (in the subjects concerned) of the baccalaureate, that is, almost as much as the weight (35%) given to the similar written baccalaureate examinations, held just 4 months later.

The conduct of a written exam is not very interesting to observe and of course I did not spend 3-5 hours watching students work individually in a gym. What we observed was the beginning and end of the tests, which were organized with care in all three schools, employing the same procedures as for the final exam. I will defer a few observations and suggestions considering the formal decorum of the written exams to Sec. 6.

More substantial was the study of the locally produced exam papers, which I collected in all three schools for a selection of subjects (mathematics, physics, L1, L2) and languages I can read. Looking at the papers from the three schools, and comparing them to the ordinary Bac exam papers, I can confirm that they are very similar in form and types of questions. Indeed, the teachers at the schools told me that they strive for this similarity, trying to prepare students well for the written bac exams, so that their mark from the Prebac is also a good prognosis for (and close to) the one obtained there. The close alignment of preliminary and final marks was exhibited in detail by one of my predecessors (Ekholm, 2009, 2009-D-609-en-2), who also noted the dubious value of the repetition on this background. Recent statistics (2015-09-D-7-en-4) confirm that the situation remains unchanged, with a slightly (less than 2%) higher preliminary mark on average.

As already mentioned in Sec. 3, the written exams in science and mathematics tend to present questions of relatively low taxonomic value, with a predominance of questions that ask students to apply rote knowledge and standard procedures. These are clearly not easy for the students and it can be assumed that a good deal of attention is given, during the years preceding the baccalaureate, to train students to succeed with such questions. The assumption is amply confirmed by the lessons I have observed. Also in other subjects,

such as first and foreign languages, teachers and school managements confirm that preparation for the written exams is an important if not dominant priority of the teachers, with the oral exams being of course also attended to, particularly in L1 and L2.

Thus, 65% of the final baccalaureate mark, in the subjects concerned, hinges upon one fixed form of written examination. This at the very least underlines the importance, for the whole system, of a solid quality control of the contents of this assessment (cf. Sec. 3). The placement of the Prebac in the middle of the year strongly enforces the ever present attention to the skills which are required in these exam papers. Therefore, it may very well be that a good deal of the class marks in the subjects with a written exam will then also reflect the teacher's assessment of whether a student demonstrates these skills in ongoing work during the year.

Puzzled by these and other indications concerning the Prebac, I took up its function and form at almost every meeting with the various agents of the ES system. Teachers and managers display, on the one hand, a strong hesitation to change a system which works well in some aspects (the number of graduates gaining access to British universities is frequently mentioned). On the other hand, it is evident to all that the Prebac consumes considerable resources: ten days of the school year, in addition to the time required for planning and grading papers, monitoring the process etc. These resources all go into holding exams which are essentially repeated a few months later. The most important effect, however, is the reinforcement of the strong focus (in teaching) on skills which can be tested in written exams with little or no aids allowed, and within a few hours.

I have, in fact, heard very few sensible arguments to justify the Prebac in its current form, besides the very fact that it is presently part of an examination system which is relatively stable and is well acknowledged by prestigious institutions of higher education. It is of course difficult to predict the outcome, in terms of mark averages, of abolishing the Prebac, and replacing this part of the internal assessment with other types of work which would promote and assess a wider set of competences. But one would certainly achieve opportunities of learning that would add more than repeating the same exam form twice. One could think, for instance, of individual or group based student projects in select subjects which could favor more independent and critical work. This could be accompanied by measures to ensure that this work is adequately assessed and that it is really done by students (methods to do so exist but are not always applied, which can then result in various forms of inequity).

My main quandary with the baccalaureate system is the large weight given to written exams (Prebac and Bac). At least in mathematics and sciences, but probably also in literary subjects, such exams often capture only a relatively narrow array of skills. As already mentioned, the Prebac strongly reinforces the focus on such skills, not only in the final mark but also in the daily teaching. Thus, if one keeps the Prebac - which I suppose will be the case - it should at least be seriously considered to reduce its weight to at most

10% of the final mark in the subjects concerned, and transfer the remaining 20% to forms of assessment which reflect a broader set of subject matter competences. These new forms should be at least partly external (for instance, individual papers or projects could be partially graded by teachers from other schools, which could also indirectly help to spread good practices in this area), cf. also Sec. 8.

One specific idea could be to let students elaborate one or two major projects in S7 (preferably to be initiated already in S6). A synoptic outline of the project could also be assessed at a final oral exam (which might replace the current third oral exam) while the project itself could be graded as explained above. Another idea, to be implemented at any rate, is to develop the design of the written exams which are presently too narrow in scope (cf. Sec. 3 and 6).

The essential contribution of such reforms would be to broaden and deepen the learning of students at an age where they should develop personal, critical and creative relationships to subject matter - to prepare them for choosing and completing further education, but also to better reflect the maturity proper to their age.

6. THE WRITTEN BAC EXAMINATIONS

About my observation of the final Bac exams, I can say little more than I said in Sec. 5. Every regulation was thoroughly observed at the schools, including the parts concerning opening of envelopes with exam papers, surveillance of exams etc. There were a few instances of trouble, as can be expected. At one school, a few students arrived about 30 minutes late for the exam, due to traffic disturbances. After due consultation, they were allowed in, in accordance with 2015-05-D-12-en-1, §6.5.6.1. Other students were absent due to other documented reasons and were subsequently granted re-examinations. I noted a particular prevalence of students at the ES in Alicante, who invoked the necessity of sitting entrance examinations for Spanish universities. But this was all handled according to the rules.

Given that the schools master these formalities so well, I wonder whether the presence of an inspector (in some cases, several) is really needed at every school; as long as several people collaborate and oversee the procedures, it seems to me that the risk of irregularities would not be increased by trusting the schools on these formalities. The legal responsibility for irregularities must, at any rate, belong to the School Director.

Still I would like to point out two technical points which, in my opinion, could be improved in the regulations as concern the procedures for the written examinations (at both Bac and Prebac):

- At the moment when the exam terminates, schools employ slightly different methods to collect the students' papers, typically involving that students themselves bring their copies to some designated place at the exit of the hall. While I did not observe major disorders in these procedures, it does create considerable noise over a period of time, and also a risk that students exchange or forget parts of their responses as they leave their desks, mingle, line up etc. It will be better if every candidate remains seated at his place until an invigilator has picked up his paper there; this would also enable the same invigilator to verify and note the number of pages handed in (to prevent students from forgetting to hand in pages, or later doubts about whether missing pages were handed in).
- The last operation would be greatly facilitated if the standard sheets (folded A3, entitled *Maturitatis examen Europaeum*) provided for the students' writing contained, on top and along with name etc., a field for numbering the sheets (preferably in the form x/y, where x is the number of the current sheet, and y the total number of sheets). The students should of course fill these fields before delivery.

Turning now to the substance of the written exams, I have already touched upon the need for genuinely external panels to audit the exam papers at regular intervals. The past years' experience with papers in mathematics and science subjects suggest that in these, it should be done annually and prior to the exams. In fact, on the demand of the Bac unit, I facilitated two such (*ad hoc*) audits by university experts in mathematics and biology. Both papers were declared fit for purpose, in view of the current syllabi. A more thorough and longitudinal quality assurance would require a panel taking a critical view also of the syllabi, and with a more substantial chance for suggesting improvements to the exam papers. But even the mere existence of such an audit proved useful to reassure bewildered parents (and teachers) of the adequacy of the two exam papers in question.

In particular, it should be noted that the Biology paper of this year was the occasion of some turmoil, which I attribute in part to an exaggerated expectation of "similarity" of exam papers from different years, and in particular of these papers being excessively focused on rote knowledge. Both parents and higher education institutions need to be reassured that exam papers really reflect the syllabi in full and that the necessary development of their contents are consistent both with these and with developments in the subject matter (at schools and in societies across Europe). The latter requirement supports my suggestion that the external auditing must also concern the curriculum since any development of assessment methods must be coordinated with developments in the curriculum (principle of *alignment*, see for instance F. English, *Deciding what to teach and test*, Corwin Press 2000).

As a mathematics educator, I cannot help to note one point concerning, more particularly, the written exam in mathematics: the fact that students use handheld calculators for a part of the exams. Research on the didactical use of calculating devices does not simply lead

to recommending or discouraging such use, and internationally there is a considerable variation of how and if they are allowed at exams (cf. e.g. Brown, R.G., *Educ. Stud. Math.* (2010) 73: 181-203). What is known, though, is that unreflected use of advanced calculators in mathematics teaching may lead to rather detrimental effects. Considering the syllabi and exam papers (of this and previous years), it is unclear to me what educational value the use of calculators brings or is expected to bring to the students' work at the exam (and, as a consequence, in the daily teaching). Moreover on a technical level, handheld calculators are currently being replaced - for many reasons - with computer software. As a matter of fact, specialist invigilators at the mathematics Bac exam spend considerable efforts to ensure the initial control of handheld devices, and to subsequently replace devices which break down throughout the exam. This is not the place to provide detailed expositions or recommendations on such a delicate matter, but both the didactical and technical challenges of the actual use needs to be thoroughly considered in a review of the mathematics curriculum.

Finally, I attended a number of discussions and actual procedures of the marking of the written exam, which will change and become digitalized from 2017. While the latter developments come relatively late, and still may leave room for improvement (such as introducing carefully controlled use by students of computers or digital pens where relevant), I am convinced the ES system is on a sound track when it comes to these formal aspects.

There is at least one point concerning the correction of papers which needs to be more strongly emphasized: the obligatory filling in of *justifying comments*, by the correctors, to accompany their mark (cf. 2015-05-D-12-en-1, p. 44). The absence of such a comment by one or both correctors represents a procedural irregularity which, in case of a complaint, entails the student a right to file for reexamination. In fact, this was the *only* reason which, this year, gave rise to accepting or partially accepting complaints. The Marking Scheme for the written exams should inform correctors that the comment field is obligatory (perhaps the formulation "Please…" suggests that it is facultative) and that the sheet will not be accepted by the competent inspector in the absence of comments for each mark. This could also be enforced through the setup of digitalized marking schemes. Alternatively, a marking scheme may be developed according to the particularity of the subject, to give a more precise and detailed account of how the mark was computed or otherwise determined.

7. THE ORAL BAC EXAMINATIONS

After attending about 20 oral examinations at four schools, in a limited array of subjects (biology, mathematics, philosophy, history, L1, L2, L3), I am of course not in a position to evaluate this part of the exams in a comprehensive way. For what it's worth, my impression - to some extent confirmed by conversations with inspectors and school

managements - is that the level and format of the oral examinations in language subjects tends to very appropriate, while the oral dimension of science subjects and mathematics may be underdeveloped.

The importance and nature of oral skills in language (and, to some extent, other aspects of the humanities) may be obvious to the lay person; it may be less so for the domains of science and mathematics. However, in these subjects, competences related to autonomous problem solving, modelling and deductive reasoning, may be quite naturally tested at oral exams (cf. e.g. http://www.primas-project.eu/). On this background, I note the slightly surprising fact that mathematics is only offered as an oral subject to those who choose the supplementary (deepening) course on mathematics, on top of the long version (Math 5P). All students pass 3 oral exams in the baccalaureate, but only about a third (36%) opt for taking one in either mathematics or science (where, in fact, a maximum of *one* such exam is possible, cf. 2015-05-D-12-en-1, p. 23 and 2015-09-D-7-en-4, p. 21). This confirms my impression that the European Baccalaureate could have a certain bias towards the humanities.

Of course, an exam format does not in itself ensure a specific outcome. While the oral language exams generally seem to test genuinely oral skills, the oral exams in science and mathematics, which I observed, tended to be based on questions which could, more or less, have been posed at a written exam. They were now simply presented by the candidate on a blackboard, after “solving” it (more or less well) during the preparation period. This confirms the evident fact that merely changing or extending the weight of oral exams, in any area, does not automatically guarantee specific objectives - changes must be aligned with curriculum reforms which favor the aspects of the subject which are not easily or normally tested in written exams.

This goes in particular for practical and experimental work, which are of course of particular importance in the science subjects. Even when there is both an oral and written exam, the above mentioned practices mean that the majority of the mark is linked to performance on more or less routine exercises, which may indeed lead to much of the teaching taking a narrow, reproduction oriented approach to these subjects.

As oral exams are quite costly, and are also uncommon at the secondary level in many countries (and thus, for many teachers), it may be considered out of reach to invest the necessary resources in the design and implementation of a more extensive scheme of oral exams. I recall that alternative approaches could be to undertake innovative, research based design of written exam questions, introduce project work as mentioned above, and certainly there are other policies and practices which are common in some school systems could be considered as well. At any rate, and despite the limited evidence I have for the current practice of oral assessment, I am convinced that the described “narrowness” of scientific subjects would be one of the most important areas of reform to consider when revising both syllabi and exam formats.

Let us finally turn to some more tedious, formal aspects of the oral exams observed. Various regulations have been recently introduced to ensure that the marking of these exams is done independently by the two examiners, and also on an absolute scale for each candidate. In particular, marking schemes are to be filled by both examiners before the average mark is calculated. This should be done right after each examination, rather than for a group of candidates at one time (bearing the risk of assessing them relatively to each other, rather than to the learning objectives). These practices were, unfortunately, not followed in all cases. In one case, the examiners did not even have the marking schemes at hand during the exam.

According to my experience, teachers were simply, at least partially, unaware of the points they did not observe. More generally, due to the ever changing body of teachers, the dissemination and enforcement of formal points need to be enforced at the level of the school; it is too late and too arbitrary when mistakes are observed and corrected on the spot, as it happens during inspection (cf. above).

In fact, inspectors are present at some oral exams and it helps them to stay informed of current practices in these, and also to discuss it with teachers in view of possible improvements of the formal aspects. The presence of an inspector is, in my opinion, most meaningful in exams within the inspectors' own subject. Even purely formal aspects, such as the good use of assessment criteria, will be most fruitfully developed in a dialogue between teachers and inspectors who know the subject of the exams well. At the same time, the inspectors need to be able to invest more time in monitoring and developing the questions formulated for oral exams (again, naturally, in their subject(s)); these are after all available through the learning gateway well ahead of the baccalaureate. In many subjects, the inspector may not be fluent in all the languages of instruction; then, translation of questions may be required to ensure that entire sections (particularly in voluminous subjects) do not remain uninspected.

8. THE WEIGHT OF INTERNAL ASSESSMENT

Some (if not most) of my predecessors have rightly expressed concern about the high weight of *internal* assessment in the total Bac result. I consider marks as "internal" if given by a teacher from the same school as the student, and as external if given by another competent person (and, where possible, with anonymity of student and marker). Even in national systems, persons employed at other schools are usually considered external.

The current weight of internal assessment can be estimated to be more than 75%: the total mark in each subject is calculated as $(a \cdot A+b \cdot B+x \cdot X)/(a+b+x)$ where a, b, and x are coefficients between 0 and 1, A and B are internal marks (class marks and prebac), and X are exam marks. Here, $a+b=0,5$. Some subjects are not assessed at final exams (so $x=0$) or prebac (so $b=0$). Even the X-marks are only half external, since the candidates' teacher

provides half of the mark. As a result, the share of internal marks in any subject is between 75% (when x=0.5) and 100% (when x=0).

To ensure both the reliability of the final result, as well as students' motivation for engaging in ongoing work at the schools, a balance of 50% internal marks and 50% external marks would be a healthy balance, especially if one maintains a reasonable correlation between the two (although they may certainly be different for individual students). A variety of models ensuring this could be proposed and applied; to begin with, it is not necessary or even desirable that teachers partake in the correction of their own students' productions in a written exam. Oral exams may still be half internal, as could be the assessment of individual student projects (cf. Sec. 5). The final baccalaureate mark could then be $0{,}4\cdot\underline{A}+0{,}2\cdot\underline{P}+0{,}4\cdot\underline{E}$, where: $\underline{A}$ is the average of all purely internal marks, $\underline{P}$ is the average of marks to which the students' teacher contributed 50% (e.g. oral exam marks), and $\underline{E}$ is the average of purely external marks (e.g. from written exams). Each of the averages could be weighted according to the volumes of hours spent on each of the subjects concerned.

I note here that other models have been discussed by my predecessors (e.g. Lahtinen, 2008) and in the *External Evaluation of the European Baccalaureate* carried out by the University of Cambridge (2009). According to the summary 2015-01-D-34-en-2 on how the various recommendations were followed up on, the 2011 reform of the Baccalaureate went in the opposite direction (more weight to internal marks, as described above). Most other models have proposed drastically lower weight to teachers' marks (like 25%). Giving it the weight of 40% was suggested by Cambridge (p. 81) to be "not inappropriate", and this is retained in the above model (if including a very reduced weight of the Prebac in $\underline{A}$, or abolishing it). Of course, it is even more important that both external marks and partially external marks are given for relevant work, by reforming the assessment methods and contents and ensuring external auditing of it, as suggested above.

9. SUMMARY OF RECOMMENDATIONS

While I have strived to argue and explain the following recommendations in more detail above, I will now provide a quick overview of the recommendations which my work as Chair of the 2016 Baccalaureate Examining Board have led me to formulate:

1. The Board of Governors is urged to undertake a serious investigation of whether the current decision and control procedures of the system could be made more efficient and less costly. Possibly new or past administrative audits may provide insights on this point.
2. The BAC unit should, on specific points, reinforce its efforts of communicating the regulations surrounding the Baccalaureate, especially to teachers and external examiners, in order to ensure that rules are known and followed by those who should apply them. In particular, the marking sheet for the written exams should

inform correctors that the comment field is obligatory - or, even better, this could be enforced automatically through the new system for digitalized correction. Likewise, the regulations for the oral exam need to be more strongly enforced, particularly as regard the use of marking sheets (to be filled independently by markers, after each exam - again, digitalization may be used to enforce both points). At the school level, efforts to learn and implement existing and new procedures need to be reinforced.

3. The Board of Governors needs to devise and implement measures to ensure that the subject-wise composition of the inspectorate becomes more adequate, to ensure at least one academically qualified inspector in each major subject.
4. The Board of Governors should consider moving resources from unnecessary control mechanisms (like inspection of formal aspects of written and oral exams, or repeats of almost identical exams) to ambitious and ongoing curriculum development, with general audits at least every five years.
5. Concretely, sustainable curriculum development could be ensured by the Secretary General, setting up independent expert panels in the major subjects, with competences and background from at least two national contexts in Europe. The competent inspector should interact closely with this panel but should not directly appoint it. These panels should retain an independent status to ensure the necessary external quality control.
6. In the area of Teachers' Professional Development, I recommend that new initiatives "close to the teaching of specific subjects" be implemented at school level. Working formats of the "lesson study" type hold a significant potential for teacher-led development of teaching, schools and indeed entire the ES system, particularly to allow teachers of the same subject (e.g. Biology) or subject family (eg. foreign language) to develop across sections. We note that as accredited schools are independently managed, special arrangements may need to be made to ensure that the teachers of these schools do not miss out on such new opportunities.
7. The status of locally hired (non-seconded) teachers needs to be scrutinized and possibly reformed, to avoid having what appears (to some) a corps of teachers which is divided in a first and second class.
8. The Board of Governors (as well as other competent committees) should reconsider the status and form of the Prebac: if not abolished entirely as an official requirement, it should at least be considered to reduce its weight to at most 10% of the final mark in the subjects concerned, and to transfer the remaining 20% to forms of assessment which reflect a broader set of subject matter competences (oral exams, project work subject to a partly external assessment, internal assessment of practical work etc.).
9. It is particularly important to ensure that the teaching and assessment of mathematics and science subjects do not end up being entirely focused on routine (even if demanding) technical skills, a danger which is more than latent in current practices. This threatening "narrowness" of scientific subjects will be one of the

most important challenges to consider when reforming both syllabi and exam formats.

10. New forms of assessment may need to be developed in connection to revised syllabi, and could include measures such as project work which is both internally and externally assessed (for instance, through grading by teachers from other schools, which could also indirectly help to spread good practices in this area - one may also consider devoting the third oral exam to a “defense” of one such project).
11. The didactical and technical challenges of the actual use of handheld calculators need to be reconsidered in a review of the mathematics curriculum, including (but of course not limited to) the regulation and design of written exams.
12. At written exams, some supplementary regulations may prevent irregularities when it comes to collecting students’ papers. For instance, it would be better if every candidate remains seated at his place until an invigilator had picked up his papers there, and the standard sheets provided for the students’ writing should contain, on top and along with name etc., a field for numbering the sheets.
13. It is neither necessary nor desirable that the students’ own teachers partake in the correction of their own student’s exam papers. Digitalization should enable new possibilities such as anonymized correction, monitoring the consistency of correctors’ grades, and random attribution of correctors across classes and schools.
14. The inspectors’ presence at written exams could be reduced or omitted. Their inspection of oral exams should be more focused on their own subject, to monitor the subject matter aspects in addition to the formal procedures, as well as the monitoring of questions (on the learning gateway) for these exams. These points evidently require that 2. and 3. above are thoroughly attended to.
15. When reforming summative assessment formats which carry weight in the final baccalaureate result, one should take care not to increase the weight of internal assessment (i.e. assessment carried out by the teacher of the candidate). My suggestion is that the total weight of internal assessment should not exceed 50%.

APPENDIX 1: CV OF CW

Education:
B.Sc. and M.Sc. in mathematics, University of Southern Denmark (1991). PhD in mathematical sciences, University of Tokyo, Japan (1994).

Employment:
Full Professor, Didactics of Mathematics, University of Copenhagen (since 2003).
Previous positions: Associate Professor of mathematics, Danish U. of Education (1998-2003); Assistant
Professor of Mathematics, University of Copenhagen (1994-1998).

International Activities and Research Projects:

- Member of the board of the European Society for Research in Mathematics Education since 2013 (since 2015 as Honorary Secretary of the Board)
- Co-founder of INDRUM (International Network for Didactical Research on University Mathematics), with a related (current) application for ITN from EU-FP8 in collaboration with partners 8 countries in Europe.
- Participation in several European projects on Inquiry Based Science and Mathematics, including S- TEAM, ASSIST-ME and MERIA.
- Joint papers with numerous international colleagues, including: H. Ando, M. Artigue, B. Barquero, M.Bosch, A. Gonzalez-Martin, V. Durand-Guerrier, G. Gueudet, N. Hardy, A. Mercier, T. Miyakawa, E. Nardi, M. De Vleeschouwer, and Hiroaki Yoshida.
- Invited speaker at numerous national and international congresses, including ICME12 (Seoul, 2012, regular lecture), CITAD4 (Toulouse, 2013, keynote), ARDM summer school (2013), Oberwolfach Workship on University Mathematics Education (2014, keynote), KHDM conference in Hannover (2015), MATRIC (Oslo, 2016)
- Member of International Programme Committees, e.g. the Nordic Conference NORMA08 (2008, chair), the European Conference CERME (three times: 2011, 2013, 2015), and the international conferences CITAD (three times: 2009, 2013, 2016), EMF (2009, 2012) and INDRUM (2016).
- Member of the editorial board of international scientific journals, including: *Recherches en Didactique des Mathématiques* (since 2006), *Research in Mathematics Education* (since 2012), *International Journal of Research in Undergraduate Mathematics Education* (since the start of this journal in 2014).

Teaching and Supervision:
Taught courses in mathematics and didactics of mathematics at all levels of the undergraduate and graduate curriculum, including several international doctoral courses. I have supervised 49 M.Sc.-theses and 4
doctoral theses to completion, and am currently the main supervisor of 6 doctoral students.

Administrative experience:

- Deputy Head for Research, Department of Science Education at U. Copenhagen, since 2007.
- Head of Research Group since 2003 (current group: Didactics of Mathematics, U. Copenhagen, with about 10 members).
- Led an audit of secondary level mathematics education in Denmark, mandated by the Danish Ministry of Education (*Matematikudredningen*), as well as several other development and survey projects for the Danish educational sector.

Examples of recent publications:

1. Bosch, M. and Winsløw, C. (2016). Linking problem solving and learning contents : the challenge of self-sustained study and research processes. *Recherches en Didactique des Mathématiques* 35 (3), pp. 357-401.
2. Ando, H., Haagerup, U. and Winsløw, C. (2016). Ultraproducts, QWEP von Neumann algebras, and the Effros–Maréchal topology. *Journal für die Reine und Angewandte Mathematik*, Vol. 715, pp. 231-250.
3. Gravesen, K., Grønbæk, N. and Winsløw, C. (to appear). Task design for students' work with basic theory in analysis: the cases of multidimensional differentiability and curve integrals. *International Journal for Research in Undergraduate Mathematics Education.*

OPINION OF THE JOINT TEACHING COMMITTEE

The Joint Teaching Committee expressed a favourable opinion regarding the report. An undertaking to implement the recurrent and easily applicable recommendations was given. They would be included in the long-term objectives of the 'Pedagogical Reform' Task Force and preparatory work would be conducted by the 'Standing Observatory of European Baccalaureate Regulations' Working Group.

The document would be sent forward to the Board of Governors for decision-making.

PROPOSAL FOR THE BOARD OF GOVERNORS

The Board of Governors is requested to scrutinize and to approve the present document.