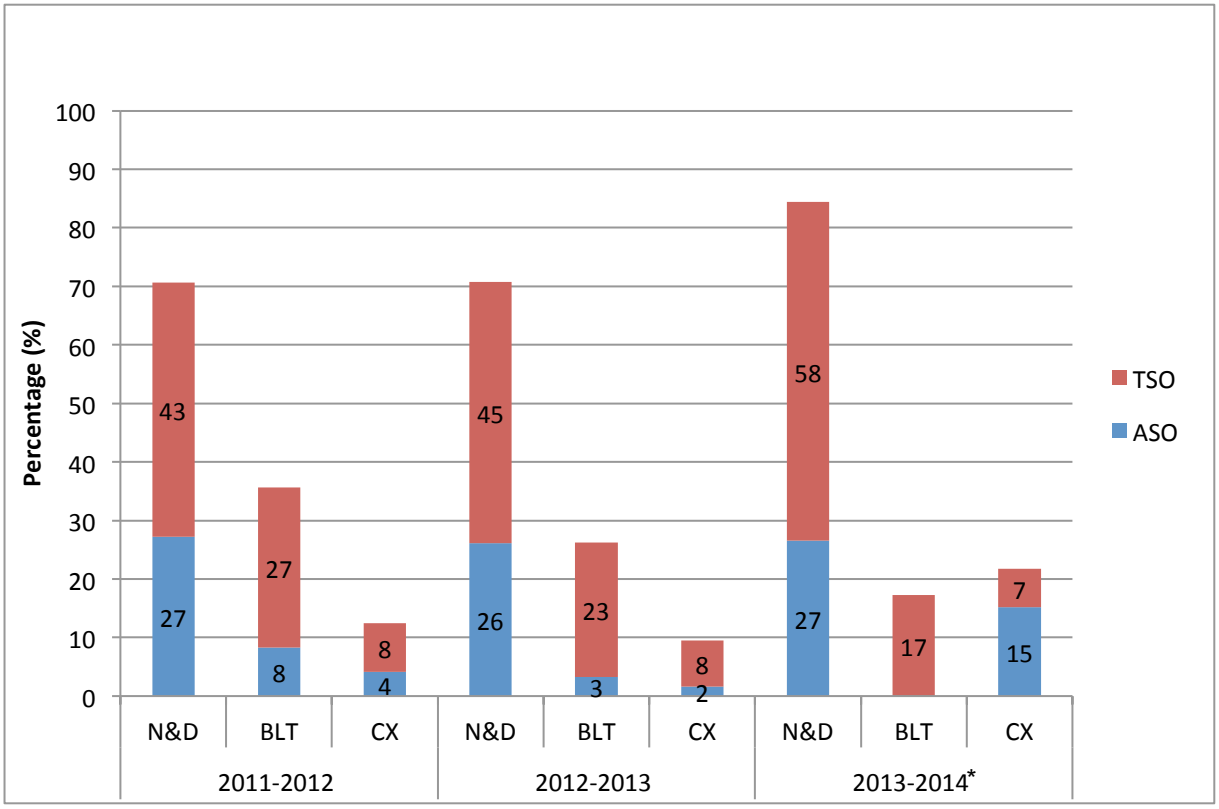

Figure 2: Percentage of incoming students with moderate curriculum in mathematics and sciences from ASO and TSO. A 100% represents all incoming students of one study course (N&D, BLT or CX). (*) Data from the current academy year 2013-2014 are not complete but are representative for the population of incoming students.

4.2 OAT results from 2012-2013 and 2013-2014

The OAT for incoming students was organised on September 2012, 17th and on September 2013, 18th. The results of the assessments are shown in figures 3 and 4. In 2012 a total amount of 64, 61 and 68 students of the Professional Bachelors in Chemistry, BLT and N&D participated, respectively, whereas in 2013 47, 58 and 68 students of the Professional Bachelors in Chemistry, BLT and N&D, respectively, did the online test. Both figures 3 and 4 clearly show that incoming students have a similar score profile on OAT after comparing the results of September 2012 to September 2013.

Students starting the Professional Bachelor in Chemistry have a good basic knowledge of mathematics and sciences. They easily reach the minimum level for math skills (level 3: > 60% in both figures 3 and 4) and chemistry (level 3: > 35% in both figures 3 and 4). The knowledge of biology is more diversified probably due to the course content of biology which is more memorisable than comprehensive (level 2 + 3: > 50%). Students subscribed in a Professional Bachelor in BLT show the same tendency. They easily reach the minimum level for math skills (level 3: > 50%) and for chemistry (level 2 + 3: > 60%) but have a more diverse score for biology (level 2 + 3: > 50%). This is probably also caused by the course content of biology which is more memorisable than comprehensive. In September 2013 BLT students have a better score on chemistry compared to September 2012. This can be ascribed to the relative high amount of students coming from the Bachelor program in Biomedical Sciences after one study year. Students starting in a Professional Bachelor in N&D have a score of > 45% (level 2 + 3) for math skills, a score of > 10% (level 3) for biology and a score of about 20% (level 2 + 3) for chemistry. The OAT results for N&D were better in September 2012 compared to September 2013. This means that the foreknowledge of incoming students is quite faint in 2013-2014 and that the incoming profiles are less instructed in mathematics and sciences.

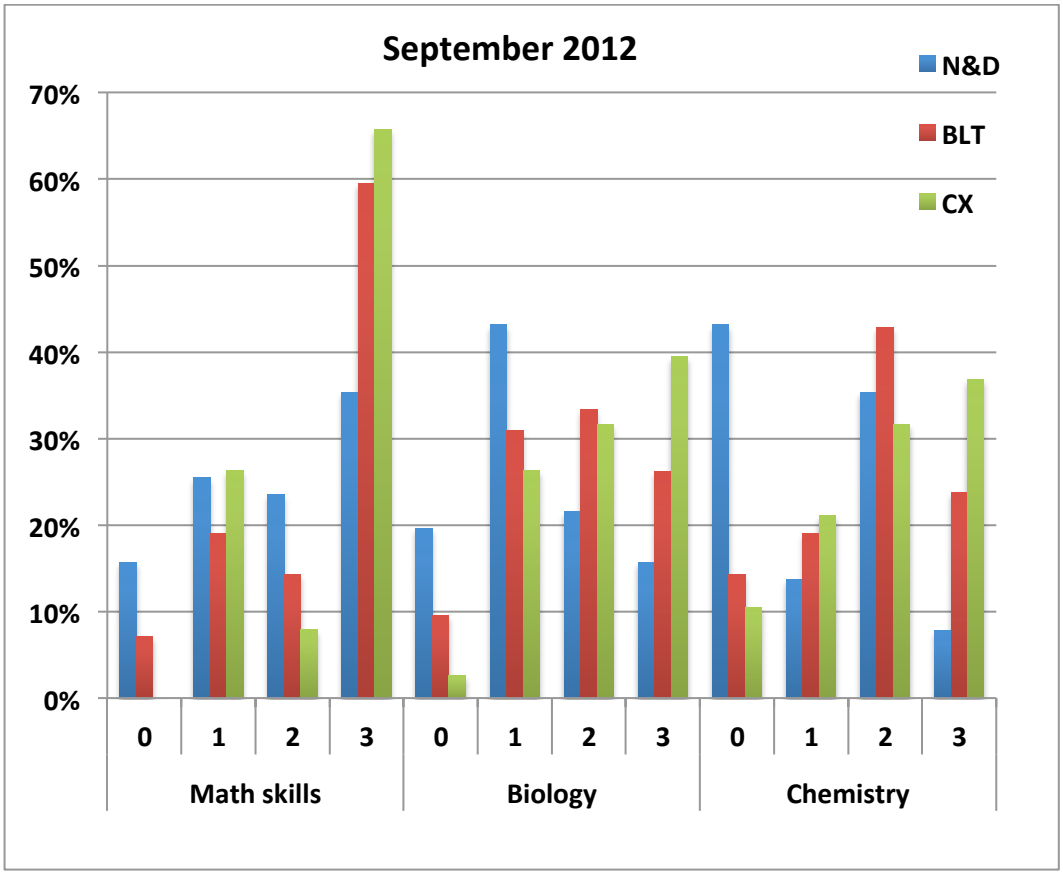

Figure 3: OAT results from September 2012 of Math Skills, Biology and Chemistry ranked by level for each Professional Bachelor program (N&D, BLT and CX).

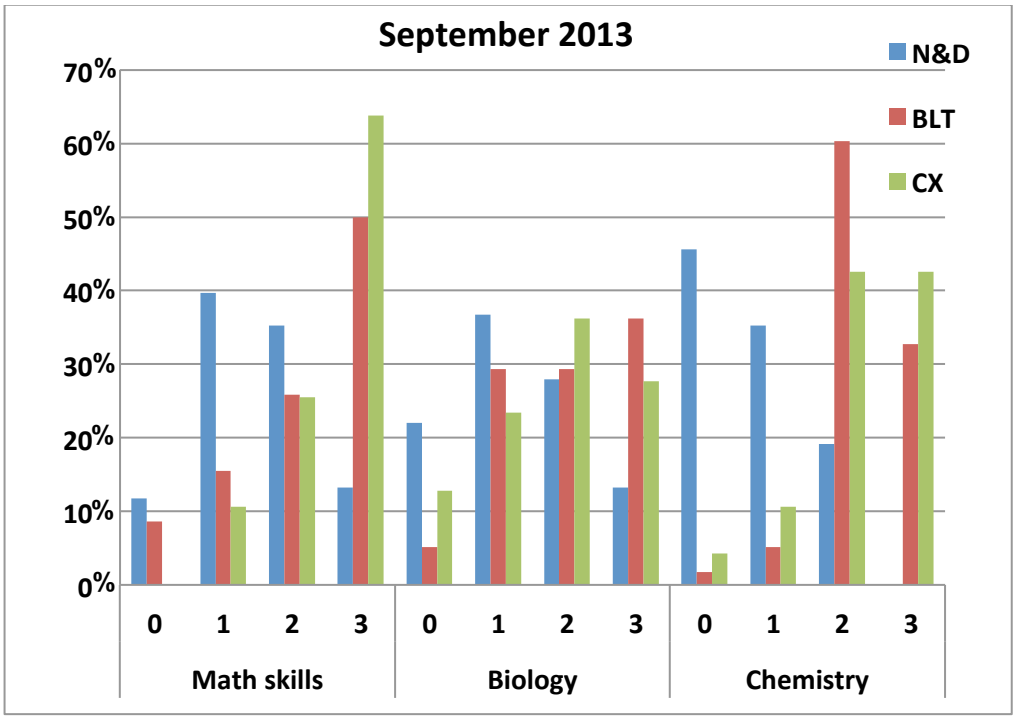

Figure 4: OAT results from September 2013 of Math Skills, Biology and Chemistry ranked by level for each Professional Bachelor program (N&D, BLT and CX).

4.3 Comparison between OAT results from 2012 and first term exam results January 2013

The third goal of this project is to find a qualitative correlation between the results of OAT and the first term exams of the students following the Professional Bachelor program in Chemistry, Biomedical Laboratory Technology or Nutrition and Dietetics. Therefore the results obtained from the incoming students who both completed the OAT and participated at the January exams in 2013 were examined. Noticeably, more relevant data are required for full statistical conclusions on the correlation between OAT results and first term exam results.

4.3.1 Chemistry

Over 30 students both participated OAT and the January exams of 2013 organized for courses in mathematics, biology and chemistry of the study program Professional Bachelor in Chemistry.

Figure 5 represents the percentage of students who passed or failed the exams in relation to the level they reached by OAT. The students were also divided in ASO or TSO according to their secondary education. The preliminary determined level is 3 for math skills and chemistry and level 2 for biology for students in Professional Bachelor in Chemistry.

The majority of students who reach level 2 and 3 for math skills and chemistry succeeds in the exams. However, more than 30% of the TSO students failed for the exams in January and had level 3 on OAT. Assumably, this outlier can be related to a lack of motivation and spending not enough time to study. The results for biology on OAT may be inconclusive to succeed the first term exams of biology. Students who reach level 0 and 1 also have the possibility to passing their exams. The reason can be found in the difference in competences between mathematics, chemistry and biology. Mathematics and chemistry require more logical reasoning and comprehensive studying whereas biology needs more memorization skills.

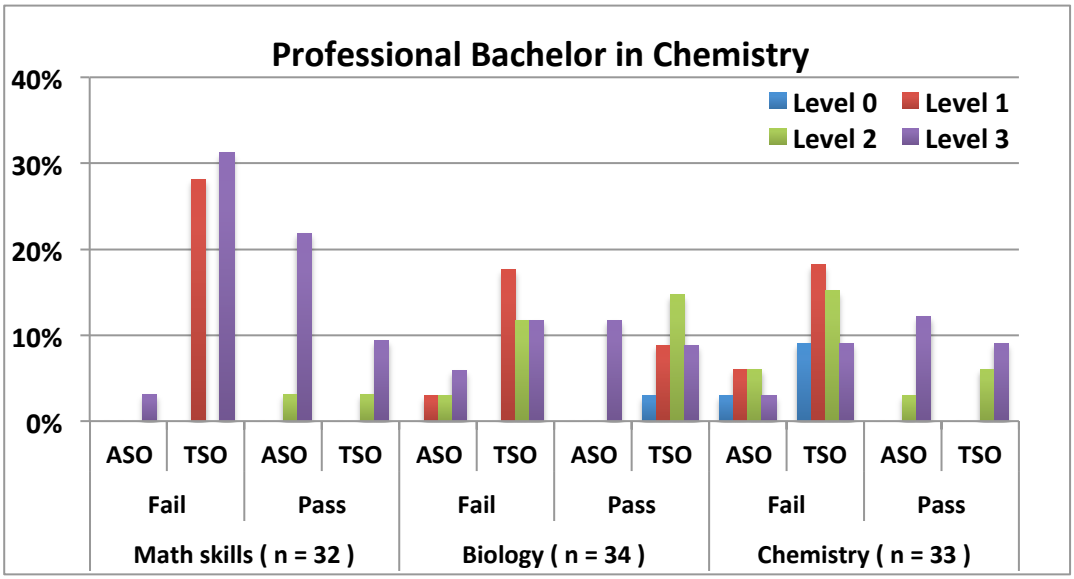

Figure 5: Relation between OAT score and first term exams in January 2013 of students in the Professional Bachelor in Chemistry. The total number of participating students is represented by n.

4.3.2 Biomedical Laboratory Technology

More than 35 students following the study program Professional Bachelor in Biomedical Laboratory Technology have both participated the OAT and the January exams of 2013 organized for the courses mathematics, biology and chemistry.

Figure 6 represents the percentage of students who passed or failed the exams in relation with the level they received by OAT. Depending on their secondary school curriculum, a division into ASO or TSO, was performed. The preliminary determined level for this study program is level 3 for math skills and level 2 for chemistry and biology.

The foreknowledge of math skills of ASO students seems to be sufficient to passing the math exam. Almost all students succeeded in passing their January exam. On the contrary, the chance that TSO students fail for their math exam is about 50%, independent on the obtained OAT level. No clear relation between the results of OAT and the biology exam is found. The same amount of students who had level 2 on OAT failed and passed the biology exams. Noticeably, all students who obtained level 3 on the OAT could not pass the chemistry exam. However, a new type of examination including multiple-choice questions, was used during the January exams of chemistry.

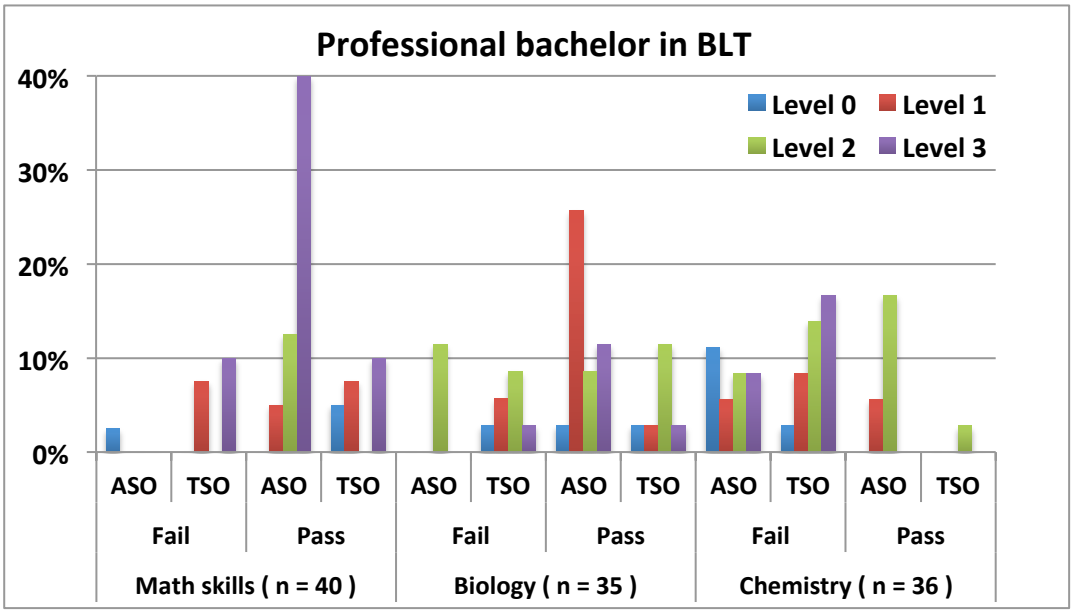

Figure 6: Relation between OAT score and the first period exams January 2013 of students in the program Bachelor in Biomedical Laboratory Technology. The total amount of participating students is represented by n.

4.3.3 Nutrition & Dietetics

In the Professional Bachelor in Nutrition and Dietetics, over 40 students both participated OAT and the January exams of 2013 organized for the courses mathematics, biology and chemistry.

Figure 7 represents the percentage of students who passed or failed on the exams in relation with the level they obtained by OAT. The students were also divided into two groups, ASO and TSO, depending on their secondary education studies. The preliminary determined level is 3 for biology and level 2 for math skills and chemistry.

The percentage of students passing the math exam seems to be very large, > 80%, for the study program Professional Bachelor in N&D. No clear correlations were found within OAT results and first term exam results. The only remarkable peak determined in figure 7 is for ASO students whose OAT level is up to 3. Exceptional, no ASO students failed for the math exam. For the scientific courses biology and chemistry, a large distribution of both type of students ASO /TSO over the different levels of the OAT is showed in figure 7. Remarkably, students reaching level 3 on the OAT could not pass the chemistry exams. A possible reason for the discrepancy between the results of OAT and the results of the January exam, may be related to some changes in the curriculum of the study program.

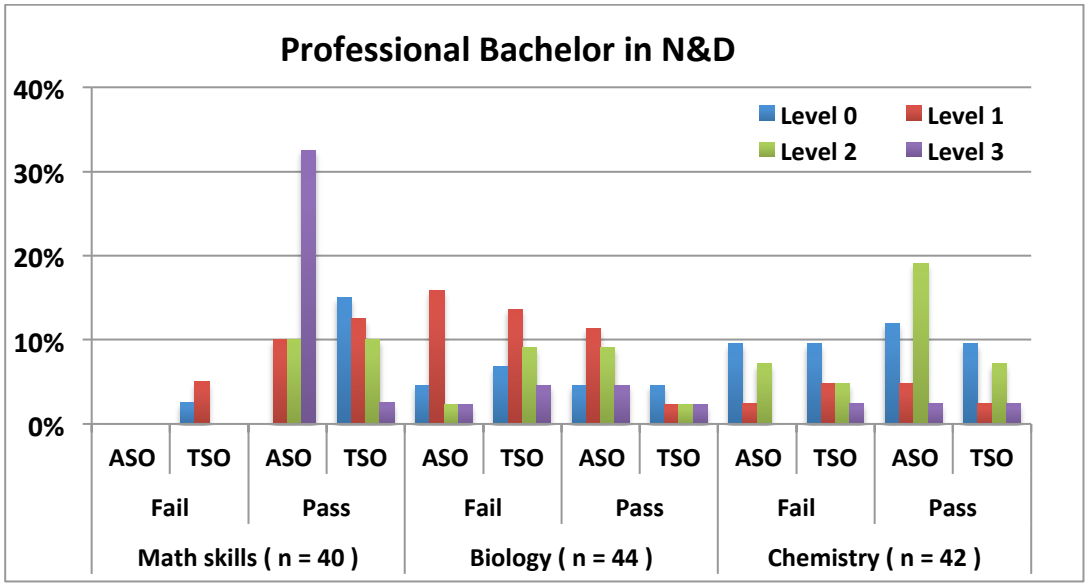

Figure 7: Relation between OAT score and the first term exams in January 2013 of students in the Professional Bachelor in Nutrition and Dietetics. The total number of participating students is represented by n.

5 CONCLUSION AND DISCUSSION

The OAT is found a suitable tool to obtain quantitative data about the foreknowledge in mathematics and sciences of incoming students interested in a Professional Bachelor in Chemistry, BLT and N&D. In general students starting a Professional Bachelor in Chemistry and BLT are well prepared to initiate the program successfully as they score good on comprehensive skills like numeracy skills and chemistry. Most of these aspirants finished a secondary school curriculum with more than 6 h/week in mathematics (ASO) or 4-6 h/weeks in mathematics (TSO) and 6 h/week in sciences (ASO) or more than 10 h/week in sciences (TSO). The study attitude is an important parameter to succeed for biology. This cannot only be derived from the OAT results but also from the first term exam results meaning a 'pass' for mathematics and chemistry in case of a good foreknowledge in numeracy skills and chemistry. A 'pass' for biology is probably more related to a positive study attitude. In de Professional Bachelor in N&D, a very heterogeneous group of students with weak to moderate background knowledge in mathematics and sciences start the program. This is reflected by weak to moderate results on OAT. Though the Professional Bachelor curriculum is not only focused on mathematics and sciences, a certain mathematical and scientific basic foreknowledge is necessary. A lot of students initiating a Professional Bachelor in N&D are not aware of the required mathematical and scientific skills. This group of students should be better informed about the curriculum and should be more supported in their choice of higher education studies at secondary school (e.g. CLB: Centre for student guidance) prior to starting this study.

A high OAT score for chemistry can be observed by incoming students Professional Bachelor in BLT in September 2013. This can be ascribed to the high number of students entering the Professional Bachelor BLT after failing in the Bachelor in Biomedical Sciences (Academic education). This means that OAT is not suited for incoming students from University as they bias the results with level 3.

The investigated relationship between OAT results and the first term exam results of January 2013 show that a minimum level of foreknowledge in mathematic skills and chemistry is required to succeed the associated exam. On the contrary, the foreknowledge in biology is less relevant to ensure passing the exams of biology.

The OAT will be further optimized in the future. It will be interesting to link data about mathematical and scientific knowledge of incoming students to knowledge about their study attitude, study motivation, ... to get a better predictive value of the test regarding first term exam results. The tool can be further used for fast and easy mid-term evaluations. It is also possible to assign incoming students to fast track or slow track programs based on their foreknowledge in mathematics and sciences tested by OAT.

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