

Student Academic Achievement Committee (SAAC) Standardized Report Form

INTRODUCTION

Program /Discipline Title: **Biotechnology**

Time Period: Fall 2007, Spring 2008, Summer 2008

Program goals, objectives, and/or mission: The goal of the Biotechnology Program is to train students to work as laboratory technicians in private, academic and industry biomedical and biotechnical labs. The Biotechnology program is a four-term program, with three semesters of intense hands-on laboratory experience and a final fourth term consisting of an internship at a local, regional or national laboratory. The program focuses on teaching hands-on laboratory skills in critical areas of biotechnology such as molecular biology, recombinant DNA technology, cell culture, protein purification and extraction, proteomics, and bioinformatics.

Exit Competencies: Upon completion of this program students will have the ability to:

Communication: Demonstrate professional conduct and interpersonal communication skills in interactions with laboratory personnel, staff, and other members of the scientific community.

Quality Control: Demonstrate the ability to follow standard operating procedures, keep accurate records, and perform equipment validation and maintenance.

Safety: Demonstrate an understanding of basic laboratory safety and the handling and disposal of radioactive, biological, and chemical wastes.

Nucleic Acids: Demonstrate an understanding of the basic properties of nucleic acids, as well as, techniques used to isolate, purify, and analyze these molecules.

Proteins: Demonstrate an understanding of the basic properties of proteins, as well as, techniques used to isolate, purify, and analyze these molecules.

Computer Skills: Demonstrate command of basic computer skills including word processing, spreadsheets, and databases, as well as, basic bioinformatics skills used to perform literature searches, and characterization of nucleic acids and proteins

Core Competencies: Core competencies measured this cycle are Teamwork and Communication

RESULTS

Introduction and discussion of assessment efforts:

Assessment was based primarily on two major methods: Instructor Evaluations and Mentor Evaluations:

Instructor evaluations consisted of my own subjective evaluations (I believe this is reasonable as the nature of the Biotechnology Program – small class size (only 6 students in this cohort) and myself as primary laboratory instructor - mean I spend a great deal of time with my students), and objective evaluations including exams, lab reports, lab notebooks, lab practicals and a comprehensive exit exam given at the end of the spring semester. Lab reports were especially useful in evaluating the Communication competency.

Mentor evaluations were in the form of written questionnaires filled out by mentors at the end of the student's internships, as well as dialog between myself and student mentors throughout the internships. The mentor evaluations are largely subjective.

Assessment Plan (Who, what, when and how assessment took place):

The Biotech program is a 4-semester cohort program (summer, fall, spring, summer), meaning the students begin and proceed through the program together. Therefore, the same group of students was evaluated in all three semesters covered. Furthermore, during the summer, I have both an outgoing cohort and an incoming cohort. For this report, the incoming cohort was not evaluated. They will be evaluated during the next reporting cycle.

Assessment of the core competencies, Communication and Teamwork was straightforward as I was able to use the available rubrics to evaluate individual students. The subcategories under each rubric were evaluated using objective measures such as lab reports and the written portion of exams (including the program comprehensive/exit exam) as well as subjective measures such as direct experience or faculty interactions with students. Student's lab reports were most useful in evaluating written communication skills, while instructor and mentor experience was primarily used in evaluating verbal communication skills.

Teamwork, in addition to being identified as a to-be-evaluated core competency, has previously been identified as key skill for Biotechnology students. Teamwork is critical when working in the lab. Contrary to popular view, scientist do not work in isolation, and instead depend on cooperation and coordination from all levels of a research team – of which lab technicians are a vital part. Therefore, teamwork skills, as defined by the core competency, are addressed throughout the Biotech program.

Assessment of the exit competencies was done by take each of the six exit competencies and their associated criteria and establish "levels" within each of these criteria (for example, what would earn a student a level of '2' versus a level of '4' for a given competency. The students were evaluated similarly to the core competencies, with a mixture of objective and subjective evaluations. The nature of the program exit competencies allowed me to use significantly more objective evaluation than subjective evaluation by drawing heavily on lab reports, a comprehensive exam, and lab practicals.

Exit Competency Results:

In general, and as in previous years, students perform at a very high level – 90 to 100% meet the skill level desired for graduation. In particular Biotech students excel at mastering technical skills associated with the Biotech degree (nearly 100% meeting or exceeding level 3). One particular student was responsible for nearly all level 2 evaluations.

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Core Competency Results:

Most students performed very well at the two core competencies measured. As in the Exit Competencies, one student was responsible for the majority of the level 2 evaluations.

Discussion of changes in support of student learning for PAST year based upon your assessment results:

1. Continued incorporation of critical thinking skills into Biotech curriculum.
2. Last year, it was noted that “Spreadsheets” (one of the sub-categories under the Exit Competency ‘Computer Skills’) was not addressed by the current Biotech curriculum. Over this last year, spreadsheet development was incorporated into two classes: Biotech Math (BIOT 1005) and Biotech Lab III (BIOT 2470).

Discussion of proposed changes in support of student learning for COMING year based upon your assessment results:

Four important observations were made while completing this evaluation:

1. More refinement of the rubrics used to evaluate the Exit Competencies is still needed – The differentiation between a skill level 3 and skill level 4 is highly subjective and needs to be better defined.
2. As in other SAAC reports, one to two students were responsible for nearly all scores of 2. More consideration needs to be given on how to improve these student’s scores to those desirable for graduation.
3. In terms of “hard skills”, i.e. Protein and DNA skills, the same sub-skills had students receiving a score of 2 as did last year. Clearly, the students need more opportunities to work on these skills in lab.
4. The creation of a “Basic Lab Skills” Exit Competency may be beneficial. This is prompted by review of mentor evaluations where a few mentors felt that while the students were skilled in more complicated techniques, they were not as strong as they might be in some basic skills. A concerted effort to re-visit or refresh students on basic skills throughout the curriculum would be very beneficial. The creation of a “Basic Lab Skills” Exit Competency may make it easier to measure or evaluate student progress in this area and ensure that students are graduating with these skills.

Plans for assessment of all Core Competencies:

All core competencies, whether there are 2 or 6 to measure, would be measured using the available rubrics, and through a combination of objective and subjective measures.

DATA

What tools did you use to measure the Exit Competencies?

Please see discussion above under “Assessment Plan”

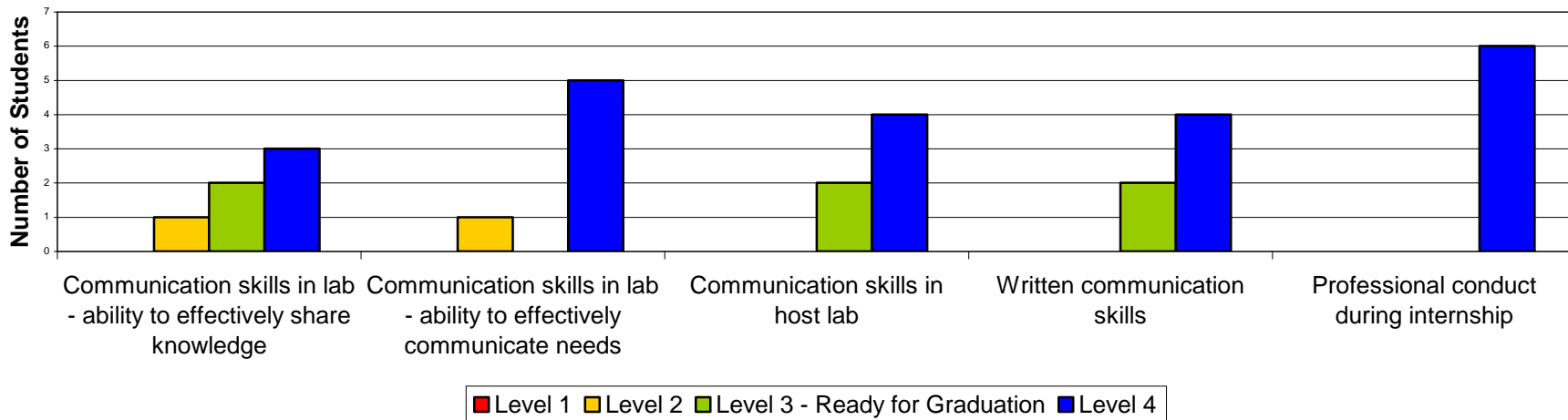
Please attach Core Competency Rubrics if modified.

N/A

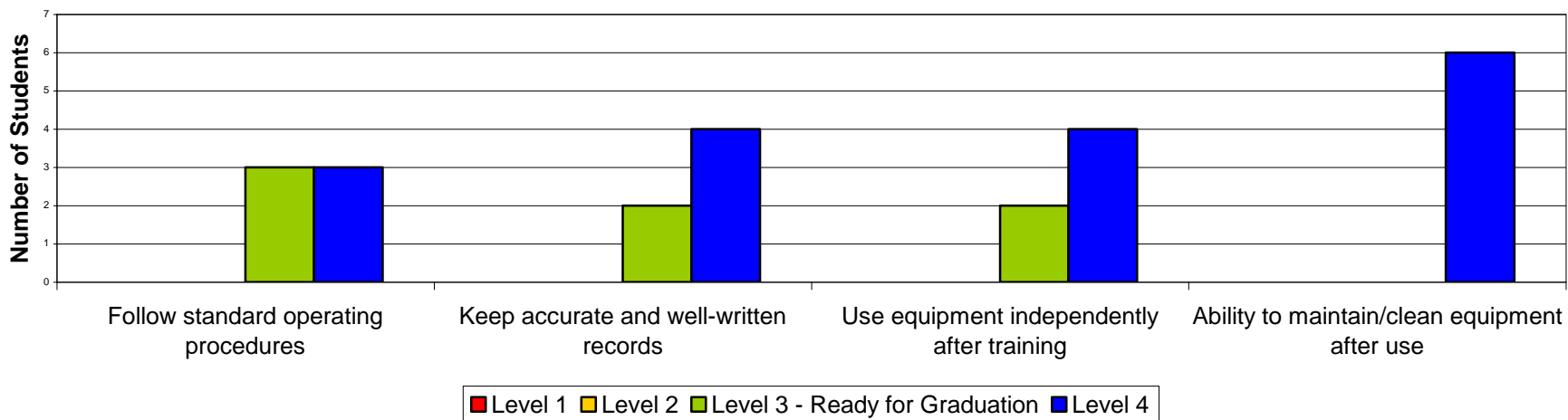
Additional assessment results:

Histograms of Exit Competency Results:

Communication

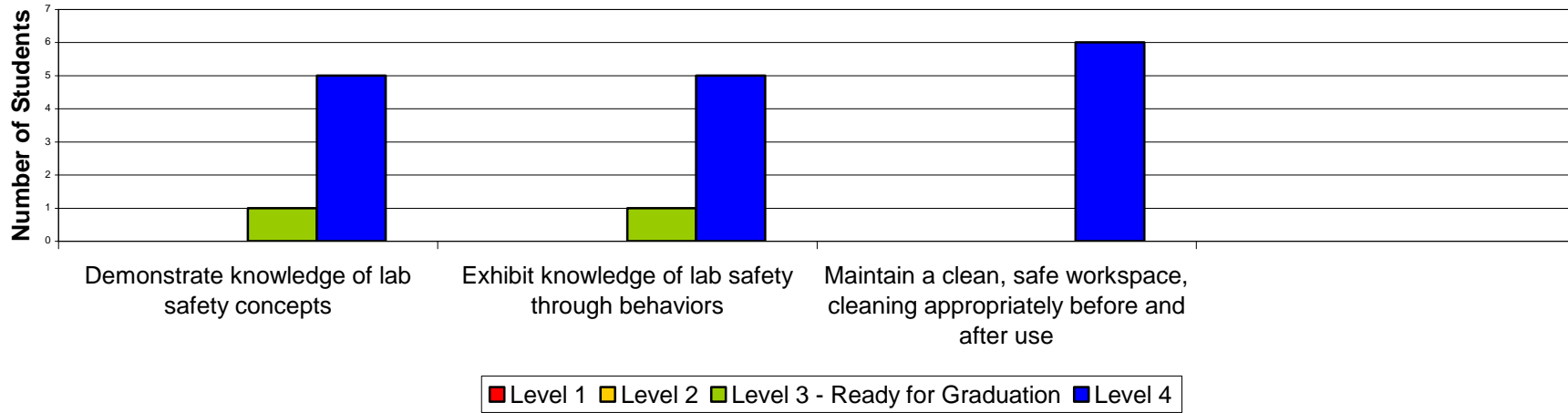


Quality Control

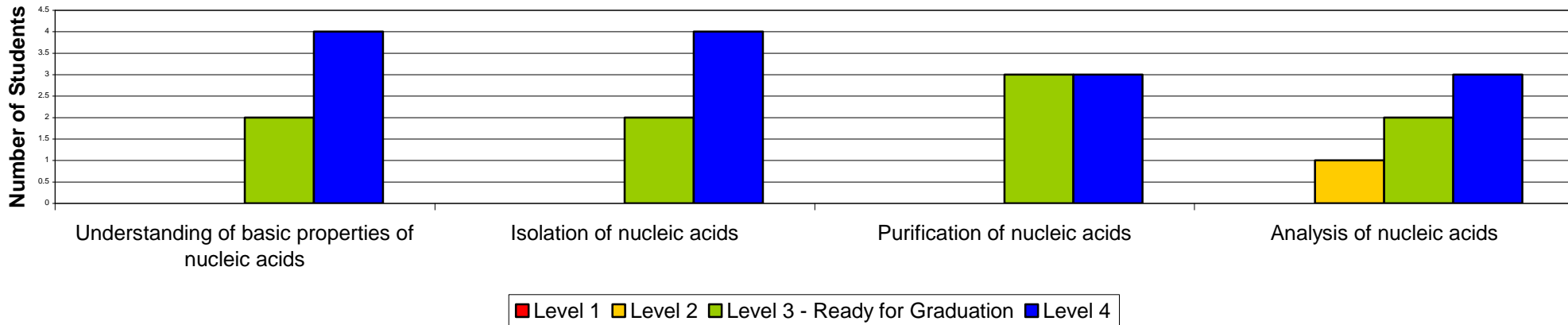


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Safety

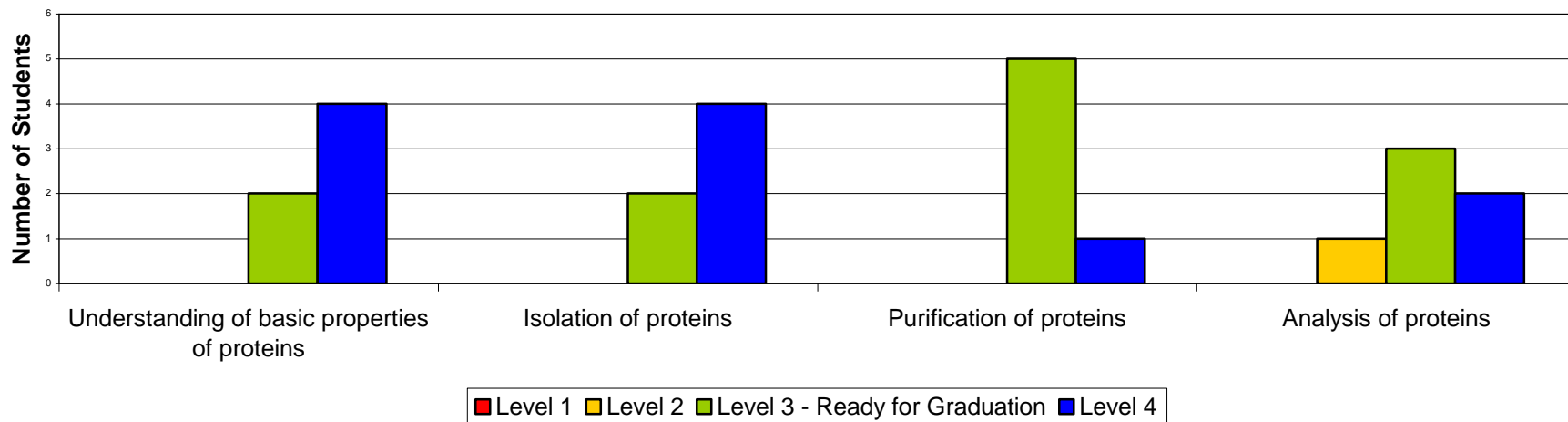


Nucleic Acids

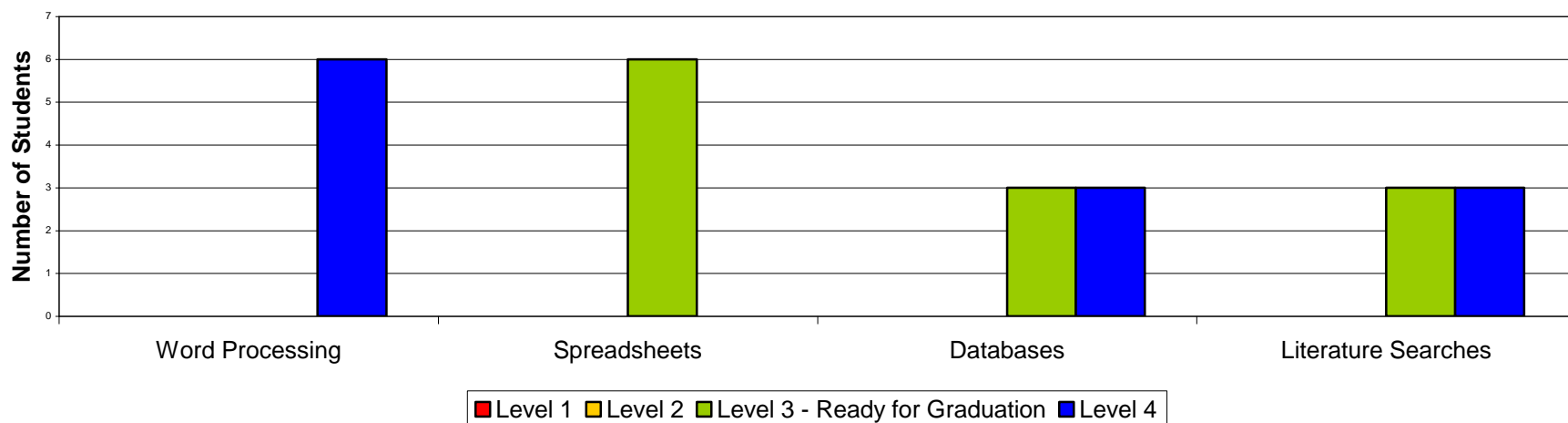


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Proteins



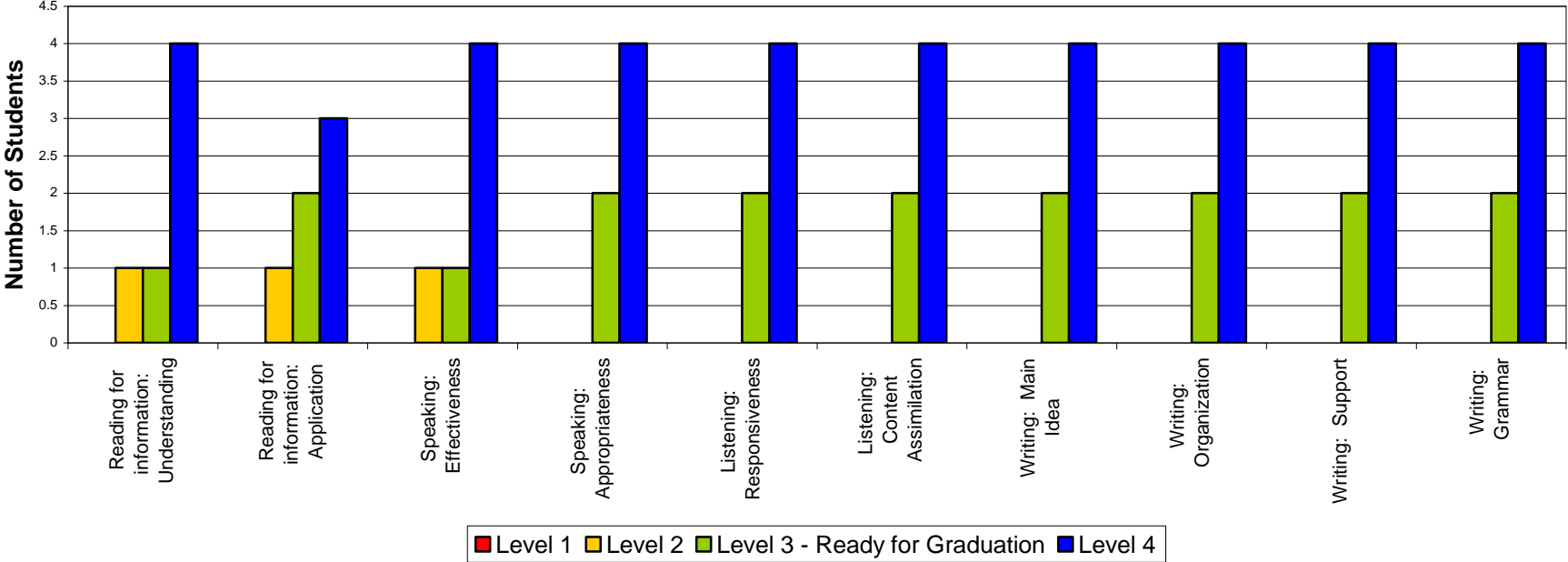
Computer Skills



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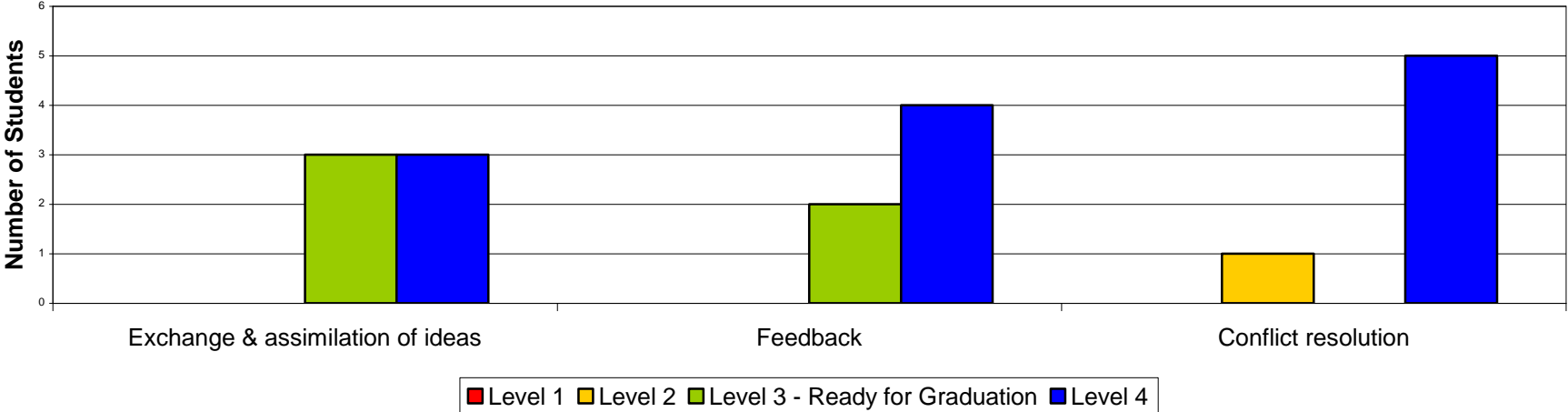
Histograms of Core Competency Results:

Communication



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Teamwork: Works cooperatively with others to accomplish a task with limited resources and competing concerns



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