

DATE: 26 June 2013
TO: Department of Mechanical Engineering Faculty
FROM: Jeff Abeysekera, MEGA President
SUBJECT: GKE Feedback from PhD Students

Introductory summary

In response to comments from students frustrated with implementation of the Mechanical Engineering Department's General Knowledge Exam (GKE), the Mechanical Engineering Graduate Association (MEGA) surveyed graduate students to assess student opinions of the GKE. This report presents our analysis of the survey results.

Survey

An initial survey draft was provided by concerned students, and the questions were refined by the MEGA executive. The final survey contained 24 questions, where students were asked about how they prepared, how specific aspects of the exam influenced their stress levels, and further asked to provide qualitative feedback on their experiences with the GKE.

The survey was advertised in the MEGA weekly announcements e-mail and at the weekly research seminars after the 2013 GKE was written. The survey was open to all PhD students who had written the GKE and was available online from Feb. 6th to March 5th, 2013. The survey received responses from 24 students, who took the GKE in the years 2008-2013, inclusive.

Discussion

Overview

There was approximately a three-way split between students supporting the GKE and its current implementation, partially supporting it, and not supporting it in its current implementation. Some students commented that they saw value in reviewing course material from their undergraduate degrees. Only two respondents indicated that all four of the subjects were related to their research. Most indicated that two subjects were related to their research. Students indicated the reasons why they think the department has the GKE are:

1. The GKE helps to filter out students who do not have the fundamental engineering knowledge to conduct research in Mechanical Engineering.
2. The department requires reassurance of our technical knowledge, independent of our transcript from our undergraduate degree.

A number of students found the GKE extremely stressful, and a number of reasons were provided. The following sections describe the students' preparation for the exam, major issues, and suggestions for improvement.

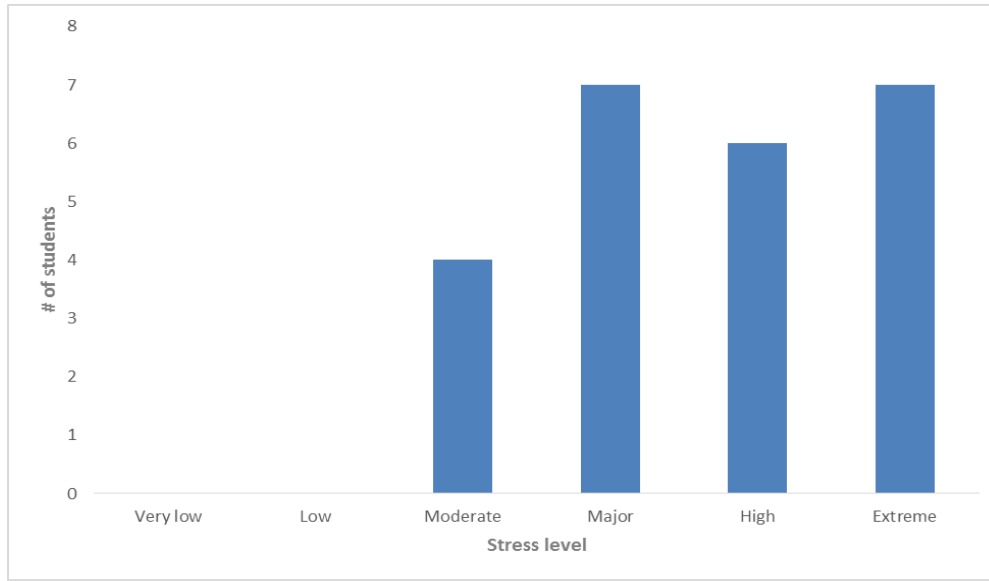


Fig. 1. The responses of students to the question: “To what extent, if any, has GKE preparation been a source of stress in your life?” The meanings of the ratings were provided with the following descriptions:

- Very low: “I was not concerned or I did not prepare”
- Low: “Less than most individual courses”
- Moderate: “Comparable to the stress from an individual course”
- Major: “More than the stress level of an individual course, but less than that of a term with heavy course load”
- High: “Spent as much time worrying about this as for all of my courses in a term with a heavy course load”
- Extreme: “Lost sleep and worried more than any other thing in grad school”

Severity assessment

The results regarding student stress levels and time spent studying suggest that the GKE does place considerable demands on students.

The GKE contributed substantially to student stress. The most dramatic response is pictured in Fig. 1. All students surveyed felt that the exam caused them at least as much stress as an individual course, and more than half of respondents felt it caused them more stress than an entire term with heavy course load.

The GKE was also a major detriment to student productivity. The amount of time spent studying for the GKE varied widely; the standard deviation of studying hours was 103 hours, with a minimum estimated studying time of 50 hours, and a maximum of 390 hours. The median studying time was 145 hours – almost a month of full time studying at 40 hours per week.

Issues of importance

Based on consultations with students prior to creating the survey, a list of commonly-mentioned grievances was compiled. Students who completed the survey were asked how each issue affected their stress levels, and based on this the relative significance of these issues as stressors was evaluated. In descending order of importance, the issues are:

1. Using a single question to evaluate knowledge of a broad subject. The anticipation of writing an exam that is perceived to not accurately reflect aptitude was identified as the greatest source of GKE-related stress.
2. The amount of sample material. Sample material was identified as important for clarifying the expected knowledge level for the exam (while breadth can be communicated through a course outline, depth is better illustrated through example).
3. Guidelines for how the exam is evaluated. Students feel that the meanings of Pass, Marginal Pass, and Fail are unclear, and as a result attempt to prepare for the worst case.
4. Availability and clarity of material in study guidelines. Some students feel that the study guidelines reference textbooks/course outlines used in UBC's undergrad curriculum for clarification on what material is covered, and that students who studied at other universities with other textbooks do not have easy access to this information. Students further commented later in the survey that the guidelines were generally unclear as to the breadth, depth, and priority of topics listed.
5. Allowing formula sheets, but not allowing textbooks. Many undergraduate courses rely on data tabulated in textbooks, and the undergraduate exams for these subjects are often open-book. Students also pointed out that real-world engineers can and do reference textbooks routinely.

If the department were to address these issues and improve the current implementation of the GKE, respondents indicated that they anticipate their stress levels would generally decrease, however the stress levels would remain at least comparable to a normal course.

Recommendations

General

In direct response to the 5 issues identified in the "Issues of importance" section, MEGA recommends that the Department:

1. Consider an alternative evaluation strategy (as opposed to a single question per subject). Although this would be a significant change, the single-question format was identified as the single greatest source of student stress.
2. Provide significantly more sample material to students to better clarify the depth of understanding expected.
3. Ensure that the meanings of Pass, Marginal Pass, and Fail are clearly communicated to students, for example by indicating how they relate to more familiar grading systems such as letter grades or percentages.

4. Reduce reliance on UBC course outlines for clarifying the subjects tested, and/or make these course outlines more available, to ensure that all study material is just accessible to new students as to those who completed undergraduate mechanical engineering degrees at UBC.
5. Ensure that any reference material required to complete the exam (such as data tables) is provided, or consider switching to a fully open-book format.

Specific ideas

Based on comments received in the survey and some brainstorming among the MEGA executive, the following specific recommendations were developed for improving the GKE:

- Communicate the reasons why the department holds a GKE more clearly.
- Clearly describe the remedial process (for students who do not pass the GKE) to all students well before the exam.
- Hold a review session for each subject, where the faculty member(s) responsible for writing the subject's question would hold a brief review and answer questions related to the guidelines and expectations. This would help clarify both the breadth and depth of expertise expected in each subject.
- Post past exams in a centralized database, and provide solutions to the exams and detailed marking guidelines for each question. Again, this would help clarify the breadth and depth of expertise expected.
- Ensure that the exam is proofread during final compilation. Some students mentioned that at least one exam was amended while students were writing, after it became obvious that students did not have the data tables required to complete the original question.
- Consider having professors solve each others' questions during the compilation stage. Even if this didn't result in many exam edits, it might be reassuring to students to know that the exam is solvable and sufficiently general that professors can solve questions about material outside of their research area. Alternately, if this would place unacceptable demands on professors' time, consider hiring a TA to do it.

The general theme of these recommendations is clearer communication; a brief tutorial held by the grad advisor at the beginning of the school year may be one method of ameliorating many of these problems.

Conclusion

This document has provided a summary of MEGA's findings after analyzing students' survey responses on how the GKE is implemented and how it affects their professional and personal life. The survey and the full data set behind our analysis were not included in this document to avoid unnecessary clutter. Further information on these items is available upon request.

MEGA feels that the most serious issue is the amount of stress the GKE is putting on students. The stress students have been experiencing is shocking, and a review of the department's goals weighted against the consequences needs to be considered.

MEGA is aware that the department is working on reforming the candidacy procedure for incoming doctoral students. We hope that this report can help inform the decision making process for the new system. Since the GKE will likely remain unchanged for the upcoming year, we also hope that some of the recommendations put forth can be implemented for the next run of the exam.

Sincerely,

Jeff Abeysekera
MEGA President (on behalf of the MEGA Executive)
PhD Candidate
jabeysekera@gmail.com