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Designing Effective Strategy for Development of Homework and Exam to Improve Learning Outcomes

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STEM Instructional Program 2019-20

Background
There are numerous unique strategies regarding homework that teachers use in their courses. Through my experience that started when I taught IEE 2622 Statistical Quality Control classes, I discovered that designing homework needs effective strategies. So, I have applied some tools that I learned from the STEM instructional program which helped me develop some of the homework or exams.

Objective
The main objectives is to determine how implementing a homework correction strategy affects student achievement in process control chart course as example. This study will answer some questions as following:
- What are the tools that can help me design homework objectives?
- How will I measure students’ abilities and levels?

Introduction
Assessment is a necessary part of the teaching and learning process, helping us measure whether our students have really learned what we want them to learn. While exams are certainly favorite and useful methods of assessment, this paper will take a look at some important elements to consider when developing homework or assignments as shown in figure 1.

Methods

- How do I Create Meaningful and Effective Homework or Exam?
  - Designing homework or an exam is interesting and challenging.
  - The questions should be clear and easy to understand.
  - Questions should start from easy to more challenging by applying quality.
  - The questions should be designed from real life.
  - Student can choose five question from seven as examples.
  - Highlight how the exam questions parallel with homework.
  - Using multiple choice questions

- How do I Develop Reliable Grading Methods to Assess Homework?
  - Using a scoring tool called Rubrics to measure and assess student learning outcomes
  - Avoid “zero” points
  - Using Scales usually have 2-10 levels
  - Plot Histogram score distribution and grading on the curve
  - Adjusting the grading scale

Provide Feedback on all Homework Assignments

- Feedback comments may be written
- Writing some guides for the student to avoid the error in the future
- If the student does well in homework that could be noted.
- Provide feedback on all homework assignments.

Case study

This study will use stats Quality Control classes as case study. This study will include about 17 students.

In these results, the summary statistics are calculated the Homework I (HWI) & Homework II (HWII) & Homework III (HWIII) and compare between them before and after applying new tools.
HWI without tools HWII&HWIII with tools in design homework
- The mean is greater than the median in HW1.
- HWI has a lower mean and less variation than HWII &HWIII
- The mean grad in HWIII was higher than both about 18.981.
- HWII &HWIII were higher than HWI as shown in Stats Analysis

T-test compare HWI&HWII
- There is difference between HWI and HWII.
- The null hypothesis is rejected, since p = 0.05 (in fact p = 0.389)

T-test compare HWII&HWIII
- There is no different between HWII and HWIII since p>0.05 (p=0.001)

Conclusion
The result shows that the HWI has the lower grades than HWII &HWIII without use tool in design homework. After applying new tools in HWII and HWIII the grades of student showed improvement. Using tools such as real life

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