

# An approach to formative feedback in statistics for a portfolio-based assessment

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# Talk overview

- What does the pedagogic literature have to say about formative assessment and feedback?
- How does this fit with current practice in statistics?
- Changes I've made to the assessment in my third-year module Data Mining with Business Applications in light of this research.
- Reflections on the move to a portfolio-based assessment and ideas for further improvement.

# Formative vs. summative assessment

- The term formative assessment was coined in the late 1960s to distinguish between two different purposes of assessment:
  - Judging/measuring learning (summative)
  - Improving learning (formative).
- Formative assessment grew in popularity in the late 1990s stemming from the research of Paul Black and Dylan Wiliam who argued that it was at the “*heart of effective teaching*” and could “*raise student achievement*”.
- This work caught the eye of policy makers due to the claim that increased use of formative assessment could raise levels of performance in mathematics amongst British students towards the top of international league tables.

# Black and Wiliam (1998)'s formative assessment recommendations

- Improve the self-esteem of pupils. Feedback should be about the quality of their work, with advice on how to improve, and avoid comparisons with other pupils.
- Develop the skill of self-assessment in pupils. Feedback requires three elements: recognition of the desired goal, evidence about present position, and understanding how to close the gap between the two.
- Tool to get to know better the understanding of all pupils in your classroom, particularly low-achieving students and those with learning disabilities, to be able to help all effectively.

# What did the literature say about feedback?

- Normative feedback can teach weaker pupils they lack ability, causing them to lose confidence in their capacity to learn (Butler 1988; Crooks, 1988).
- Schunk & Swartz (1993) showed that better results were secured by giving process goals rather than product goals.
- Bangert-Drowns et al. (1991) found that feedback was most effective when it was designed to stimulate correction of errors through a thoughtful approach to them in relation to the original learning relevant to the task.

# What does the literature say about assessment for learning in higher education?

- Sambell *et al.* (2013)'s model of Assessment for Learning has six central principles:
  1. Authentic assessment (promotes student engagement).
  2. Balancing summative and formative assessment.
  3. Creating opportunities for practice and rehearsal (before summative assessment).
  4. Designing formal feedback to improve learning.
  5. Designing opportunities for informal feedback.
  6. Developing students as self-assessors and effective lifelong learners.

# What do Sambell *et al.* (2013) say about formal feedback?

- They advocate building in other kinds of formal feedback from tutors, more frequently and at earlier stages, so that comments are received before the assessment end-point, so that they can “*feed forward*” directly into refinements and revisions of future work.
- For example, feedback on draft pieces of work could be given, with the aim of showing students what has been done well, and what has not, and how their work could be improved.
- They also encourage drawing on other sources of feedback including self- and peer review and reflection.

# Advice from Ashton and Stone (2021) on formative feedback

- Advocates capturing the potential of feedback as a way of communicating which is two-way and engages students.
- Recommendations to overcome these problems included:
  - Phrase feedback as “*feedforward*”, e.g., “*Next time make sure to...*”.
  - Give students an example of a draft piece of work, with feedback and the subsequent changes carried out to make the revision process more transparent.
  - Use lots of different ways to feedback and work out the best way for your students. Create a climate where errors are publicly debated in a spirit of support and enquiry (Biggs and Tang, 2011).



# What does the statistics literature say about assessment and feedback?

- *“Identify the skills students are supposed to learn, and then give students opportunities to perform and practice all of those skills.”*
- *“Learning is more efficient when students receive real-time feedback on errors.... This leads to the guideline: try to ‘close the loop’ as tightly as possible between students’ thinking and the instructor’s feedback.”*  
– Lovett and Greenhouse (2000).
- *“Integrating new authentic assessment techniques that address students’ ability to evaluate and utilize statistical knowledge, communicate and justify statistical results, and produce and interpret computer output.”*
- *“Target misconceptions through discussion and assessment.”* - Tishkovskaya and Lancaster (2012).

# Assessment changes at Sheffield Hallam University

## – move to portfolio-based assessment

- In the academic year of 2020/21, the Department of Engineering and Mathematics underwent an assessment simplification process.
- It was decided to restrict the number of summative assessment tasks within a 20-credit module to at most two, although allowing the possibility to have a greater number of activities within a portfolio-based assessment.

# Portfolio definition

- *“A portfolio consists of a series of thematic activities, some of which are designed to give the opportunity for formative feedback so that students can enhance their learning and improve their work during the course of the portfolio.”*
- *“A portfolio is distinct from a series of assignments because it assesses both the process of development and the output.”*
- *“A portfolio will also include evidence of reflection, either as an element in itself, or as part of the process of development.”*

# Changes made to assessment in my data mining module to meet the portfolio requirements

- Students having the opportunity to gain formative feedback on a first draft of their group report for Activity 1: EDA of the Case Study Data and submit an improved version in the final portfolio submission.
- For activity 2, students now produce a recorded video presentation rather than doing a live presentation.
- A fourth activity was added to the assessment where students write a reflective covering letter for the portfolio.

# Module performance

Year	n	Mean	Median	Q1	Q3	Pass rate
2019/20	29	59.2	64	55	71	89.7%
2020/21	32	58.1	62	55.5	70.5	81.3%
2021/22	9	62.8	65	55	74	88.9%
2022/23	8	69.1	71	67.3	81	87.5%
2023/24	7	65.4	74	60	74	85.7%

# MEQ comments about the approach to assessment

- “The portfolio was set up well, it was great to work on assignments after receiving feedback.”
- “Feedback is thorough and really enables the students to take that forward into future pieces of work.”
- “Feedback is very good and extensive, and support is very helpful from lecturer.”

# Reflections on the move to portfolio-based assessment

- Students responded positively to the changes in assessment in this module, as they could see the benefit of getting formative feedback and an indication of their current level of performance whilst working on the portfolio.
- Students took first attempts at work seriously and there was no noticeable drop in interim performance.
- Drawback: can lead to a small increase in assessment burden for students and marking burden at the end of the module.
- Module naturally fit into being assessed by a portfolio (was already assessed by a course long case study, some choice already embedded within assignments, topics taught build logically).
- Ideas for further improvement: making activity briefs less prescriptive and more open ended.

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