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Does Continuous Assessment Using Rubrics Help To Uncover Unexpected Gaps in Student Understanding?

Kevin McCarthy

Department of Electrical and Electronic Engineering,
University College Cork,
Ireland

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Conference Theme: Teaching and Learning in Higher Education: Challenging Assumptions

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Abstract

“Continuous Assessment – Rubrics and Uncovering Student Misconceptions”

Module EE4011, “Radio Frequency Integrated Circuit Design”, an optional final-year module in the B.E. (Electrical) programme at UCC, incorporates a computer-based assignment which accounts for 20% of the final marks. In 2007/8, a detailed marking scheme in the form of a rubric was given to the students with the assignment to allow them to clearly see where effort should be expended in the assignment itself and in the written report on which the marks would be based.

The final grades for the continuous assessments were determined by systematically evaluating how closely each student had met the standards of performance as specified in the rubric. By concentrating on the rubric for the purposes of evaluation, the assessor was not as distracted by small errors or misconceptions in the student reports as could possibly occur when grading the reports without the help of the detailed rubric. In fact, by concentrating on the rubric for grading purposes, the assessor felt a certain leeway to reevaluate the reports from a student learning perspective in order to gain insights into minor misconceptions which occasionally appeared. These minor misconceptions could subsequently be clarified in a follow-up tutorial.

Thus, the rubric-based approach, while primarily targeted in this instance at determining a grade, created clarity at grading time and allowed a separation between the task of grading and the search for misconceptions which could hinder student learning, with the latter being an unexpected but welcome bonus.

Introduction

Module EE4011, “Radio Frequency Integrated Circuit Design”, is an optional final-year module in the B.E. (Electrical) programme at UCC and incorporates a computer-based assignment which accounts for 20% of the final module marks. In the academic year 2007/8, the specification and grading of this assignment was guided by an increased awareness of the Teaching for Understanding framework [Hetland, 1988] and by the use of assessment rubrics [McCarthy, 2007] encountered as part of the Post-Graduate Certificate in Teaching and Learning in Higher Education undertaken by the author. This paper reports on the increased insights into student learning achieved through a combination of these factors.

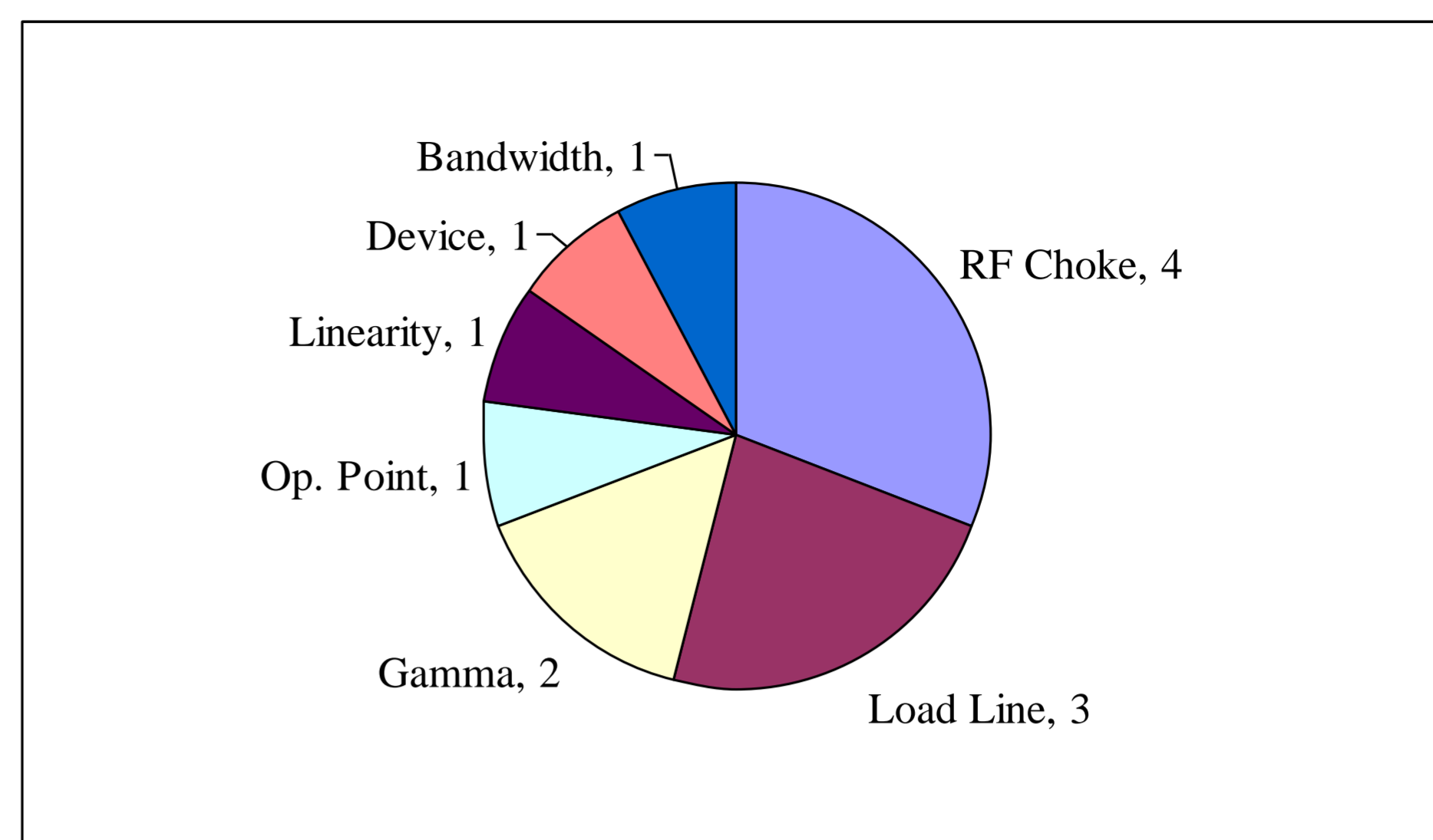


Figure 2: Remaining Uncertainties

Criterion \ Grade	Excellent (> 70%)	Very Good (60% - 69%)	Good (50% - 59%)	Satisfactory (40% - 49%)	Unsatisfactory (< 40%)
Circuit Simulations and Knowledge of Simulator (Contributing 30% of the final report marks)	An extensive range of simulations extending beyond the core requirements indicating a deep working knowledge of the simulator and familiarity with a range of circuits.	All of the required and some additional simulations have been performed demonstrating deeper knowledge of the simulator and the assignment.	All of the required simulations have been performed and discussed indicating a good working knowledge of the software.	Most of the required simulations have been performed and discussed.	Most of the required simulations have not been performed or presented in graphical form indicating a weak working knowledge of the software.

Table 1: Extract from the Assessment Rubric

Assignment and Assessment Rubric

The assignment concerned the analysis of a simple radio frequency power amplifier (RF PA) using a widely available RF computer aided design package and the preparation of a report which would be graded according to a detailed rubric involving four categories as follows: (i) Organization and Presentation (20%), (ii) Circuit Simulations and Knowledge of Simulator (30%), (iii) Interpretation of Simulations and Link to Lectures (30%) and (iv) Reflection and Appraisal (20%). Table 1 is an extract from the detailed rubric which outlined the overall weighting of each of the four categories as well as the required standard for the various grade levels within each category.

Assignment Results

Figure 1 shows the breakdown of results, illustrating that 80% of the reports met either the “very good” or “excellent” criteria, indicating that most students closely followed the rubric provided.

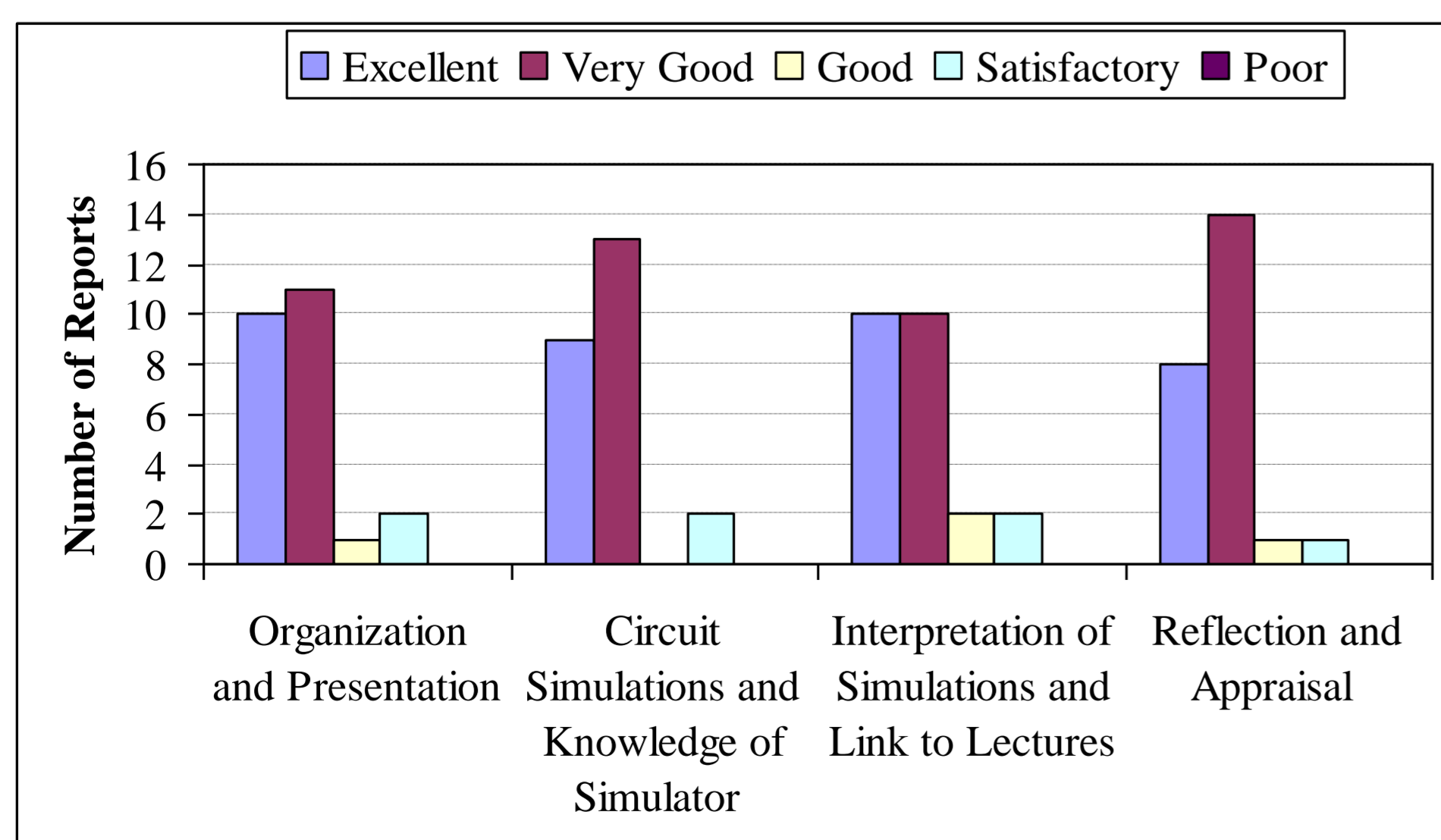


Figure 1: Grading w.r.t. the Rubric

Remaining Uncertainties

By concentrating on the rubric for the purposes of evaluation, the lecturer was not distracted by small errors or misconceptions occasionally encountered in the reports which would usually have impacted on the assessment methodology. In fact, these small errors were now looked upon as a way of gaining insight into student understanding. Figure 2 shows the typical errors or misconceptions that appeared and their frequency of occurrence. These represent typical areas of confusion concerning the design of radio frequency amplifiers including the role of the RF choke, the importance of the dynamic load line, the definition of reflection coefficient (Gamma) and others. Having identified these confusing points, it was possible to devote time in a subsequent lecture to clear up the associated misunderstandings.

Conclusion

The rubric-based approach, while primarily targeted in the EE4011 assignment at determining a grade, created clarity at grading time and allowed a separation between the task of grading and the search for remaining gaps in student understanding. This allowed these remaining gaps to be dealt with in class before the students faced into their final examinations.

References

- Hetland, L., Hammerness, K., Unger, C. and Wilson, D.G. (1998) *How Do Students Demonstrate Understanding?* In Wiske, M.S. *Teaching for Understanding: Linking Research with Practice*, San Francisco: Jossey-Bass.
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