

The Use of Portfolios in Chemistry Practical Assessments.

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Modules Involving a Portfolio

- Four modules where we have introduced portfolios
- FS0705, a first year module on basic techniques
 - Microscopy, tlc, spatter patterns
- FS0802, an introductory analytical module
 - Sample preparation, titrations, spectroscopy
- FS0901 and FS0902, a ‘circus’ of different practicals
 - 4 recovery and examination labs, plus 4 others (e.g. paint, GRIM, metal properties, GSR)
 - Pyrolysis, charring, flame spread, accelerant and explosive analysis



FS0705: background planning

- A new module with 9 practicals
- We considered the option of a skills test
 - But we want to develop note-taking skills
- Considered separate reports
 - This would give regular feedback
 - But is intensive (weekly marking), and discourages use of a labbook
- The labbook is inspected each week but is marked at the end of the series.



FS0705: our observations

- This has worked successfully, but was time-intensive for marking
- We are considering changing to laboratory examination forms on a weekly basis instead



FS0802: the historical assessments

- A series of 9 practicals
- Used to be submission of a single full report
- Students were usually given a choice of 1 out of 2 practicals to allow for a bad day
- A problem with students not fully interacting with practical data until the write-up
- It is possible for students to take a chance and miss some practicals



FS0802: our revised thinking

- Interpretation of analytical data is important
- Worksheets were available electronically



FS0802A Forensic Chemical Analysis

Practical Lab sheet for

Determination of Iron in Breakfast Cereal

Name: _____

Date of Experiment: _____

Name of Lab partner(s): _____

Results

Mass of cereal: _____

Wavelength = _____

Sample										
mL standard										
mg Fe added										
Absorbance										

Insert Graphs**Hand Drawn Graphs**

Use ink that is not easily removed. Label axes etc. Draw the best fit line.

Scan hand drawn graphs and save as a picture, then Insert - Picture - From File.

Make sure the inserted picture is legible if it can't be read, it can't be marked!

Excel Graphs

You can input your results into Excel and create graphs which you can then copy into this Word Document.

Calculation.**Discussion.** Any unusual results? Any errors? Interpretation? Look at the lab write-up requirements e.g. do you have to comment on reproducibility.**Conclusion.** Short and clear. What were you trying to achieve?

FS0802: our revised thinking

- Interpretation of analytical data is important
- Worksheets were available electronically
- Students submitted their results, a brief discussion and reflection, and a conclusion
- Feedback is given with a 2 week turnaround
 - A problem for first 4 weeks
- All worksheets are submitted with an overall reflection on the series



FS0802: marking

- Each worksheet was graded α , β , γ , or δ
- Grades were combined by an algorithm to give an overall grade
 - How many reports need to be first class for the overall grade to be first class?
- This grade was then adjusted according to their reflection
 - Evidence that they had been learning as the series progressed gave them an enhanced grade, and vice versa



FS0802:future revision

- The portfolio generally worked well
- Weekly feedback was intensive for staff
- Students needed more guidance for the discussion and interpretation, so we will use questions in early practicals
- Students also need guidance on reflection to avoid listing feedback comments



FS0901 and FS0902

- Assessment had been one practical write up plus a skills test.
- Students now submit a shortened submission for each practical
- A critical reflection is then added to complete the portfolio for marking



FS0901 and FS0902

- Students tended to prepare full write ups
- It was resource intensive for feedback and marking
- However, students have had to fully engage with result interpretation
- Next year clearer instructions will be given for simpler submissions



Conclusions

- Portfolios can be an effective assessment tool for chemistry-based practicals
- They need careful consideration to avoid excessive work for students and staff
- Marking schemes need to be transparent
- Students need clear guidance on what is required, particularly reflection.



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- **The Use of Portfolios in Chemistry Practical Assessments**

- **Dr Graham Wightman, University of Abertay**

- Practical work is a critical skill for students of chemistry .At Abertay we have historically used several different approaches, including: practical reports, assessment of the lab book, and practical tests. Each type of assessment emphasises a different aspect of practical work. However, there has been some criticism of practical reports in that they are very time consuming and assess communication skills rather than practical ability
- To try and avoid these issues we have explored the use of practical portfolios on chemistry-based modules on our forensic science course. We also wanted to improve engagement with all practicals rather than just those where students thought would be assessed. Although there was variation between different modules, the basic model was that to build their portfolio students had to submit a worksheet of the results for every practical and this was given a formative grade and feedback was given to the student. To complete the portfolio the student has to submit a reflection on what they have learned during the series.
- From our first year using this assessment we have seen the potential for this form of assessment, but have recognised errors we made. Firstly, care is needed to ensure student and staff workload is not increased. Secondly, students need guidance on reflection. Thirdly marking criteria need to be correctly developed. Changes have been made for next year.

