

Plagiarism issues

The following is an extract from an article by Reid, N. ; Shah, I. *Chem. Educ. Res. Pract.*, **2007**, 8 (2), 172-185 entitled *The role of laboratory work in university chemistry* .

(Note that the APA system of referencing is used in this journal article, rather than the ACS system that we recommend for report writing (and we use in the lab manuals).)

Historical perspective of laboratory work

The first teaching laboratory in chemistry in Britain was established by Thomas Thomson in the University of Edinburgh in 1807. In 1819, he introduced this to the University of Glasgow, when he joined this University. In 1824, Liebig established a Chemistry Laboratory at the University of Giessen. This was a most exciting period of the nineteenth century. Liebig's was the first institutional laboratory in which students were deliberately trained for membership of a highly effective research school by means of systematic research experiments (Morrell, 1969, 1972).

Laboratory classes then gradually developed over the next fifty years until eventually, in 1899, it came to be considered necessary that school pupils be allowed to carry out experiments for themselves. By this time, however, most schools in England had already adopted this way and regarded practical work as an essential requirement for science teaching in England (Gee and Clackson, 1992). Thus, practical training in chemistry sprang up in universities all over the Europe and North America. These were devoted to the teaching of skills directly used in industries and research (Letton, 1987; Johnstone and Letton, 1989; Khan, 1996). Practical work at this time played a vital role in confirming the theory which was already taught in the classroom. However, some doubts also arose about the efficiency of teaching through practical work in chemistry.

This work in higher education had its impact on school teaching in the sciences. Here, a century ago Armstrong advocated the direct experimentation by the pupils rather than demonstration experiments performed by the teacher. However, too much time was wasted on repetitive individual practical work (Hodson, 1990). Therefore, attention switched back once again to teacher demonstration. In 1932, the Education Board in England supported the same idea (pamphlet no. 89). This declared that there was "too much practical work of the wrong kind, too much remote from the natural interests and everyday experience of the children" (cited in Hodson, 1993). In 1935, Schlensenger studied the contribution of laboratory work to general education. He noticed that students who had previously exhibited "real interest in chemistry developed the habit of doing their experiments mechanically to get the result expected rather than to observe what is actually going on in their test tubes" (Letton, 1987). Little seems to have changed since then.

Here are the relevant parts of four reports written independently by four students. Which ones are acceptable and which ones would be guilty of plagiarism?

Student A

Chemistry teaching laboratories were established in Europe in the early 19th century (1). By the turn of the 20th century, practical work in schools was developed and regarded as an essential component in the teaching of science (1). Such practical training was focused on teaching the skills needed in industry and research (1).

1. Reid, N. ; Shah, I. *Chem. Educ. Res. Pract.*, **2007**, 8 (2), 172-185.

Student B

Chemistry teaching laboratories were established in Europe in the early 19th century (1). By the turn of the 20th century, practical work in schools was developed and regarded as an essential component in the teaching of science (2). Such practical training was focused on teaching the skills needed in industry and research (3-5).

1. Reid, N.; Shah, I. *Chem. Educ. Res. Pract.*, **2007**, 8 (2), 172-185.
2. Gee B.; Clackson S.G., *School Science Review*, **1992**, 73, 79-83
3. Letton K.M., M.Phil. thesis, Jordanhill College of Education, Glasgow, Scotland, **1987**.
4. Johnstone A.H.; Letton K.M., *Kemia-Kemi*, **1989**, (2), 146-50.
5. Khan M.I. M.Sc. thesis, University of Glasgow, **1996**.

Student C

Chemistry teaching laboratories were established in Europe in the early 19th century (1). Laboratory classes then gradually developed over the next fifty years until eventually, in 1899, it came to be considered necessary that school pupils be allowed to carry out experiments for themselves.

1. Reid, N.; Shah, I. *Chem. Educ. Res. Pract.*, **2007**, 8 (2), 172-185.

Student D

Chemistry teaching laboratories were established in Europe in the early 19th century (1). "Laboratory classes then gradually developed over the next fifty years until eventually, in 1899, it came to be considered necessary that school pupils be allowed to carry out experiments for themselves." (1)

1. Reid, N.; Shah, I. *Chem. Educ. Res. Pract.*, **2007**, 8 (2), 172-185.

Answer key

Student A's report is fine. All facts have been appropriately referenced.

Student B has referenced each fact to its source, but since student B did not read those specific references, citing them is not appropriate. It would not be a case of plagiarism, but it is poor practice. Instead, each fact could be referenced using the phrase 'as cited in' but it is probably easier to use only reference 1 as student A did.

Student C has copied a chunk verbatim and although the reference is acknowledged, the copied section is not in quotation marks. This would constitute plagiarism, as well as poor practice. Since the copied section is not particularly necessary to have verbatim, it would be better to re-phrase and simply reference.

Student D has used quotation marks and referenced the source of that quote. Therefore not plagiarism. It would be better writing if the content had been re-phrased.