

## Meaningful Learning in the Laboratory Instrument (post-course)

Adapted from Galloway & Bretz (2015)

Instruction: When answering the below questions, please think particularly about the **chemistry laboratory** and the learning and experiences that you encountered there.

*Note for teachers: the original focus of this instrument was the chemistry laboratory, but it is likely to be applicable to other disciplinary laboratory contexts. We have highlighted key words in red to call your attention to where you may want to adapt this questionnaire for your context.*

1. How useful to your life do you expect the **chemistry** that you learned to be?

Not at all useful	Slightly useful	Somewhat useful	Quite useful	Extremely useful
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2. How often did you feel concerned about finishing the laboratory work on time?

Not at all concerned	Slightly concerned	Somewhat concerned	Quite concerned	Extremely concerned
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3. To what extent did you make decisions about what data to collect?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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4. Overall, how sure or unsure do you feel about the purpose of the laboratory procedures followed in this course?

Very unsure	Quite unsure	Both sure and unsure	Quite sure	Very sure
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5. How often did you experience moments of insight?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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6. How often did you feel confused about how the instruments work?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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7. To what extent do you think your critical thinking skills improved during the course?

Did not improve at all	Slightly improved	Somewhat improved	Quite improved	Extremely improved
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8. How excited were you, normally, about doing **chemistry**?

Not at all excited	Slightly excited	Somewhat excited	Quite excited	Extremely excited
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9. How nervous were you, normally, about making mistakes?

Not at all nervous	Slightly nervous	Somewhat nervous	Quite nervous	Extremely nervous
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10. To what extent did you have to consider whether your data makes sense?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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11. How often did you have to think about what the **molecules** are doing?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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12 How organised did you feel, normally?

Not organised at all	Slightly organised	Somewhat organised	Quite organised	Extremely organised
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13. How confident do you feel in the laboratory, following the course?

Not confident at all	Slightly confident	Somewhat confident	Quite confident	Extremely confident
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14. How often did you worry about getting good data?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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15. How simple did you find the procedures, normally?

Not at all simple	Slightly simple	Somewhat simple	Quite simple	Extremely simple
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16. Overall, how confused do you feel about the underlying concepts used in the course?

Not at all confused	Slightly confused	Somewhat confused	Quite confused	Extremely confused
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17. How often did you get stuck and then keep trying?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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18. How nervous were you about handling **chemicals**, normally?

Not at all nervous	Slightly nervous	Somewhat nervous	Quite nervous	Extremely nervous
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19. How often did you think about **chemistry** that you already knew?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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20. How worried were you about the quality of your data, normally?

Not at all worried	Slightly worried	Somewhat worried	Quite worried	Extremely worried
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21. How often did you get frustrated in the laboratory?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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22. How often did data interpretation go beyond only doing calculations?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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23. How often did you focus on procedures more than concepts?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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24. How often did you use observations to understand the behaviour of **atoms and molecules**?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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25. How often did you make mistakes and try again?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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26. Overall, how intrigued were you by the instruments?

Not at all intrigued	Slightly intrigued	Somewhat intrigued	Quite intrigued	Extremely intrigued
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27. How intimidated did you feel, normally?

Not at all intimidated	Slightly intimidated	Somewhat intimidated	Quite intimidated	Extremely intimidated
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28. How often did you feel confused about what your data mean?

Almost never	Once in a while	Sometimes	Frequently	Almost always
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29. How confident do you feel about using equipment, following the course?

Not at all confident	Slightly confident	Somewhat confident	Quite confident	Extremely confident
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30. To what extent do you think your problem solving skills improved in the course?

Did not improve at all	Slightly improved	Somewhat improved	Quite improved	Extremely improved
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