

Meaningful Learning in the Laboratory Instrument (pre-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 expect to encounter 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 learn to be?

Not at all useful	Slightly useful	Somewhat useful	Quite useful	Extremely useful
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2. How concerned are you 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 do you expect to make decisions about what data to collect?

I do not expect to make decisions about what data to collect	I am not sure whether I will make decisions about what data to collect	I somewhat expect to make decisions about what data to collect	I am quite sure I will make decisions about what data to collect	I am certain I will make decisions about what data to collect
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4. How sure or unsure do you expect to feel about the purpose of the laboratory procedures?

I expect to feel very unsure	I expect to feel quite unsure	I expect to feel both sure and unsure	I expect to feel quite sure	I expect to feel very sure
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5. To what extent do you expect you will experience moments of insight?

I do not expect to experience moments of insight	I am not sure whether I will experience moments of insight	I somewhat expect to experience moments of insight	I am quite sure I will experience moments of insight	I am certain I will experience moments of insight
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6. How concerned are you about being confused about how the instruments work?

I am not at all concerned	I am slightly concerned	I am somewhat concerned	I am quite concerned	I am very concerned
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7. To what extent do you expect to learn critical thinking skills?

I do not expect to learn critical thinking skills	I am not sure whether I will learn critical thinking skills	I somewhat expect to learn critical thinking skills	I am quite sure I will learn critical thinking skills	I am certain I will learn critical thinking skills
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8. How excited are you about doing **chemistry**?

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

I am not at all nervous	I am slightly nervous	I am somewhat nervous	I am quite nervous	I am extremely nervous
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10. To what extent do you expect you will have to consider whether your data makes sense?

I do not expect to have to consider whether my data makes sense	I am not sure whether I will have to consider whether my data makes sense	I somewhat expect to have to consider whether my data makes sense	I am quite sure I will have to consider whether my data makes sense	I am certain I will have to consider whether my data makes sense
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11. To what extent do you expect to have to think about what the **molecules** are doing?

I do not expect to think about what molecules are doing	I am not sure whether I will think about what molecules are doing	I somewhat expect to think about what molecules are doing	I am quite sure I will think about what molecules are doing	I am certain I will think about what molecules are doing
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12 How organised do you expect to feel?

Not organised at all	Slightly organised	Somewhat organised	Quite organised	Extremely organised
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13. To what extent do you expect to develop confidence in the laboratory?

I do not expect to develop confidence in the laboratory	I am not sure whether I will develop confidence in the laboratory	I somewhat expect to develop confidence in the laboratory	I am quite sure I will develop confidence in the laboratory	I am certain I will develop confidence in the laboratory
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14. To what extent do you expect to worry about getting good data?

I do not expect to worry about getting good data	I am not sure whether I will worry about getting good data	I somewhat expect to worry about getting good data	I am quite sure I will worry about getting good data	I am certain I will worry about getting good data
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15. How simple do you expect to find the procedures?

Not at all simple	Slightly simple	Somewhat simple	Quite simple	Extremely simple
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16. How concerned are you about being confused about the underlying concepts?

Not at all concerned	Slightly concerned	Somewhat concerned	Quite concerned	Extremely concerned
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17. To what extent do you think you will get stuck but keep trying?

I do not expect to keep trying	I am not sure whether I will keep trying	I somewhat expect to keep trying	I am quite sure I will keep trying	I am certain I will keep trying
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18. How nervous are you about handling **chemicals**?

Not at all nervous	Slightly nervous	Somewhat nervous	Quite nervous	Extremely nervous
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19. To what extent do you expect to think about **chemistry** that you already know?

I do not expect to think about chemistry that I already know	I am not sure whether I will think about chemistry that I already know	I somewhat expect to think about chemistry that I already know	I am quite sure I will think about chemistry that I already know	I am certain I will think about chemistry that I already know
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20. To what extent do you expect you will worry about the quality of your data?

I do not expect to worry about the quality of my data	I am not sure whether I will worry about the quality of my data	I somewhat expect to worry about the quality of my data	I am quite sure I will worry about the quality of my data	I am certain I will worry about the quality of my data
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21. To what extent do you expect that you will get frustrated in the laboratory?

I do not expect to get frustrated in the laboratory	I am not sure whether I will get frustrated in the laboratory	I somewhat expect to get frustrated in the laboratory	I am quite sure I will get frustrated in the laboratory	I am certain I will get frustrated in the laboratory
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22. To what extent do you expect that data interpretation will go beyond only doing calculations?

I do not expect data interpretation will go beyond calculations	I am not sure whether data interpretation will go beyond calculations	I somewhat expect that data interpretation will go beyond calculations	I am quite sure that data interpretation will go beyond calculations	I am certain that data interpretation will go beyond calculations
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23. Do you expect to focus on procedures more than concepts?

I do not expect to focus on procedures more than concepts	I am not sure whether I will focus on procedures more than concepts	I somewhat expect to focus on procedures more than concepts	I am quite sure I will focus on procedures more than concepts	I am certain I will focus on procedures more than concepts
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24. To what extent do you expect you will use observations to understand the behaviour of **atoms and molecules**?

I do not expect to use observations	I am not sure whether I will use observations	I somewhat expect to use observations	I am quite sure I will use observations	I am certain I will use observations
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25. To what extent do you expect to make mistakes, but try again?

I do not expect to try again after making mistakes	I am not sure whether I will try again after making mistakes	I somewhat expect to try again after making mistakes	I am quite sure I will try again after making mistakes	I am certain I will try again after making mistakes
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26. To what extent do you expect you will be intrigued by the instruments?

I do not expect to be intrigued by the instruments	I am not sure whether I will be intrigued by the instruments	I somewhat expect to be intrigued by the instruments	I am quite sure I will be intrigued by the instruments	I am certain I will be intrigued by the instruments
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27. How intimidated do you expect you will feel?

Not at all intimidated	Slightly intimidated	Somewhat intimidated	Quite intimidated	Extremely intimidated
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28. To what extent do you expect you will be confused about what your data mean?

I do not expect I will be confused about the meaning of my data	I am not sure whether I will be confused about the meaning of my data	I somewhat expect I will be confused about the meaning of my data	I am quite sure I will be confused about the meaning of my data	I am certain I will be confused about the meaning of my data
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29. How confident do you expect you will be when using equipment?

Not at all confident	Slightly confident	Somewhat confident	Quite confident	Extremely confident
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30. To what extent do you expect you will learn problem solving skills?

I do not expect I will learn problem solving skills	I am not sure whether I will learn problem solving skills	I somewhat expect I will learn problem solving skills	I am quite sure I will learn problem solving skills	I am certain I will learn problem solving skills
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