Compilation of existing instruments for data cleaning, organization, management, analysis, and visualization, open source software, and cloud computing.

**Directions**: For each item add a +1 for your vote on keeping the question as is or adapting it. If you don't think the question should be included leave the fields blank. Include comments for *adapting* the question.

## Computer Self-Efficacy Measure
## Computer Self-Efficacy

I could complete the job using the software package…

| | Not at all confident | | | | Moderately confident | | | | | Totally Confident |
|---|---|---|---|---|---|---|---|---|---|---|
| YES | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| NO | | | | | | | | | | |

In general I can use computer technology to complete a task…

| **Strongly disagree 1** | **Disagree 2** | **Neither agree nor disagree 3** | **Agree 4** | **Strongly agree 5** |
|---|---|---|---|---|

| Item | Keep | Adapt | Don't use | Comments |
|---|---|---|---|---|
| ...if there was no one around to tell me what to do as I go. | | +3 | | We can ask this question regardless of what lesson was taught. -klj<br>Like the concept, just not the exact wording -tkt |
| ...if I had never used a package like it before. | | +1 | | "Like it" is ambiguous, but I like this question especially for the R/python lessons. -eab<br>Depends on the 'software' listed if there is something like it that would make sense. -tkt |
| ...if I had only the software manuals for reference. | | +3 | | Change "software manuals" to "help files" or "documentation" (this may depend on technology). -eab agree with this |

| | | | | |
|---|---|---|---|---|
| | | | | comment -tkt |
| ...if I had seen someone else using it before trying it myself. | | | +2 | All of the learners will have seen someone using the technologies at the workshop. Unless we want to use this for pre/post. . . -eab |
| ...if I could call someone for help if I got stuck. | | | +2 | Not relevant to us or informative for our teaching model. -eab |
| ...if someone else had helped me get started. | | | +2 | “Helped me get started” is ambiguous. Also all of our learners will have had “help getting started” by the end of the workshop. -eab |
| ...if I had a lot of time to complete the job for which the software was provided. | | +2 | | I don’t like the wording, but I like the idea. Essentially we’re asking here if the learner thinks they could do the task if it wasn’t time limited. -eab |
| ...if I had just the built-in help facility for assistance. | | +1 | +1 | We can ask this question regardless of what lesson was taught. -klj<br><br>I disagree. I think “the built-in help facility” is ambiguous. Is this the ?function in R? Or the info tab in RStudio? Or the error messages? -eab<br>This is similar to the “with only the manuals” question and if adapted to “with help files” is the same. -tkt |
| ...if someone showed me how to do it first. | | | +2 | All of our learners will have had this by end of workshop. -eab |

| | | | | |
|---|---|---|---|---|
| ...if I had used similar packages before this one to do the same job. | +1 | +1 | | We'll have to think about 'packages'. I'm not sure what the right unit is here. -tkt |

## Java Programming Self-Efficacy Scale
## Computer Programming Self-Efficacy Scale

Additional reference

| Not at all confident 1 | Mostly not confident 2 | Slightly confident 3 | 50/50 4 | Fairly confident 5 | Mostly confident 6 | Absolutely confident 7 |
|---|---|---|---|---|---|---|

| Item | Keep | Adapt | Don't Use | Comments |
|---|---|---|---|---|
| I could write syntactically correct Java statements. | | | +2 | Most learners won't know what "syntactically" means. -eab |
| I could understand the language structure of Java and the usage of the reserved words. | | | +2 | We don't go into "reserved words" in R. Also we don't talk about the language structure as such. In general we don't get into the organizational aspects of the language, but focus on the practical. -eab |
| I could write logically correct blocks of code using Java. | | +2 | +1 | Using R or Python -klj<br>I like the sentiment of this, but I'm not sure that learners will know what "logically correct blocks" means. - eab - JW |

| | | | | |
|---|---|---|---|---|
| I could write a Java program that displays a greeting message. | | | +2 | Not a relevant task to our learners -eab |
| I could write a Java program that computes the average of three numbers. | | +1 | +1 | For this and similar statements, I would much prefer to have a MCQ that actually tests this ability. - eab<br>I also agree about having a MCQ (although we would need to set that up) but I like the idea of this question, and that it is skill based |
| I could write a Java program that computes the average of any given number of numbers. | | | +1 | For this and similar statements, I would much prefer to have a MCQ that actually tests this ability. - eab |
| I could use built-in functions that are available in the various Java applets. | | +2 | +1 | Built in packages for R/Python -klj<br>This is very very broad. I don't know that I would be able to say that I can use all the built-in functions in baseR. -eab<br>I like the idea of knowing how to use libraries or packages in Python or R. This is an important skill! -tkt |
| I could build my own Java applets. | | | +2 | Equivalent for R would be learner writing their own package, which is well beyond scope of our curriculum. -eab |
| I could write a small Java program given a small problem that is familiar to me. | | +1 | | I like this sentiment. Something like I could write code to solve a small problem that is familiar to me. This is just what we're trying to have them do. -tkt |
| I could write a reasonably sized Java program that can solve a problem this is only vaguely familiar to me. | | | +1 | More than we should expect -tkt |

| | | | | |
|---|---|---|---|---|
| I could write a long and complex Java program to solve any given problem as long as the specifications are clearly defined. | | | +1 | |
| I could organize and design my program in a modular manner. | | +2 | | Not sure we're really teaching this, but maybe should be emphasizing it more. -tkt |
| I could understand the object-oriented paradigm. | | | +1 | |
| I could identify the objects in the problem domain and could declare, define, and use them. | | | +1 | |
| I could make use of a pre-written function, given a clearly labeled declaration of the function. | | | +1 | |
| I could make use of a class that is already defined, given a clearly labeled declaration of the class. | | | +1 | |
| I could debug (correct all the errors) a long and complex program that I had written and make it work. | | +1 | | I like the debugging, but maybe this could be a 'simple problem' -tkt |
| I could comprehend a long, complex multi-file program. | | | +1 | |
| I could complete a programming project if someone showed me how to solve the problem first. | | +3 | | Complete/run a set of analyses in R or Python -klj<br>Maybe phrase as "I knew how to solve the problem", maybe we'd need an example of what was meant -tkt |

| | | | | |
|---|---|---|---|---|
| I could complete a programming project if I had only the language reference manual for help. | | | | These all seem similar to above. Use same ratings. |
| I could complete a programming project if I could call someone for help if I got stuck. | | | | |
| I could complete a programming project once someone else helped me get started. | | | | |
| I could complete a programming project if I had a lot of time to complete the program. | | | | |
| I could complete a programming project if I had just the built-in help facility for assistance. | | +1 | | Complete/run a set of analyses in R or Python -klj |
| While working on a programming project, if I got stuck at a point I could find ways of overcoming the problem. | +2 | | | Like this! -tkt |
| I could come up with a suitable strategy for a given programming project in a short time. | | | +1 | I think this is more than we can expect -tkt |
| I could manage my time efficiently if I had a pressing deadline on a programming project. | | | +1 | |
| I could mentally trace through the execution of a long, complex multi-file program given to me. | | | +1 | |

| | | | | |
|---|---|---|---|---|
| I could rewrite lengthy and confusing portions of code to be more readable and clear. | | | +1 | |
| I could find a way to concentrate on my program, even when there were many distractors around me. | | | +1 | |
| I could find ways of motivating myself to program, even if the problem area was of no interest to me. | | +1 | | Like this idea if it was “I could find ways of motivating myself to program, if the problem area was of interest to me.” -tkt |
| I could write a program that someone else could comprehend and add features to at a later date. | | +2 | | |

## Python Coding Ability Scale

| Strongly disagree<br>1 | Disagree<br>2 | Agree<br>3 | Strongly agree<br>4 |
|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| I can write syntactically correct Python statements. | | | These all seem similar to above -tkt |
| I understand the language structure of Python. | | | |
| I can write logically correct blocks of code using Python. | +1 | | |

| | | | |
|---|---|---|---|
| I can write a Python program that displays a greeting message. | | | |
| I can write a Python program that computes the average of three numbers. | | | |
| I can write a Python program that computes the average of any set of numbers. | | | |
| I can write a small Python program to solve a problem that is familiar to me. | +2 | | |
| I can write a complex Python program to solve any given problem as long as the specifications are clearly defined. | | | |
| I can design a Python program in a modular manner. | | | |
| I understand the object-oriented paradigm. | | | |
| I can make use of a pre-written function if given a clearly labeled declaration of the function. | | | |
| I cannot complete a programming project unless someone else helps me get started. | | | |
| I can debug a long and complex program that I have written. | | | |

| | | | |
|---|---|---|---|
| I can comprehend a long, complex multi-file program. | | | |
| I cannot complete a programming project unless someone shows me how to solve the problem first. | | | |
| I cannot complete a programming project unless I have the language reference manual. | | | |
| I can complete a programming project if I have a lot of time to complete the program. | | | |
| I can complete a programming project if I have just the built-in help facility for assistance. | +1 | | |
| I can find ways of overcoming the problem if I get stuck at a point on a programming project. | +1 | | |
| I can come up with a suitable strategy for a given programming project in a short time. | | | |
| I cannot complete a programming project unless I can call someone for help if I get stuck. | | | |
| I can mentally trace through the execution of a complex multi-file program developed by someone else. | | | |

| | | | |
|---|---|---|---|
| I can rewrite confusing portions of code to be more readable. | +1 | | |
| I can find a way to concentrate on my program, even when there are many distractions around me. | | | |
| I can find ways of motivating myself to program, even if the problem area is of no interest to me. | | | |

## Computational Understanding Scale

| Strongly disagree<br>1 | Disagree<br>2 | Agree<br>3 | Strongly agree<br>4 |
|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| I understand what “$ cat hashbang.py” means. | | | I like the idea of asking about particular commands. We don’t teach shell though, so we’d have to think of the right commands to use that would be representative -tkt |
| I understand what “cp” means. | | | |
| I know what grep does. | | | |
| I understand what “str[1:-1]” means. | | | |
| I know how to define a function in Python. | +2 | | |

| | | | |
|---|---|---|---|
| I know how to raise an exception in Python. | | | |
| I understand what “git merge” means. | +1 | | If git was taught in the lesson. -klj |
| I am familiar with the SVN version control system. | | | |
| I understand what “git checkout -f” means. | | | |
| I know what SQL is. | | | |
| I know how to program a join. | | | |
| I recognize when a database is designed adequately for my needs. | +1 | +1 | Or, I know how to design a database to meet my needs. -klj<br>I’d maybe say “know when databases are useful” -tkt |

## Perception of Computational Ability Scale

| High ability<br>1 | Intermediate ability<br>2 | Low ability<br>3 | No ability<br>4 |
|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| Python coding | | | Are these phrased as “what is your perception of your ability” so it’s clear that it’s their perception and not their actual ability? -tkt |

| | | | |
|---|---|---|---|
| Python debugging | | | |
| Unix scripting | | | |
| Unit testing | | | |
| Version control | +1 | | If taught in the workshop. -klj |
| Databases | | | |

## Attitudes (Spreadsheet Application)

| Strongly disagree<br>1 | Disagree<br>2 | Neither disagree nor agree<br>3 | Agree<br>4 | Strongly agree<br>5 |
|---|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| The spreadsheet's output is presented in a useful format. | | | These are about people using spreadsheets well. We're more teaching spreadsheets to get people out of spreadsheets, so I think we need different questions. It's not about a particular spreadsheet, but spreadsheets in general. -tkt |
| You are satisfied with the accuracy of the spreadsheet. | | +1 | Maybe "You are satisfied with the accuracy of spreadsheets" -tkt |
| The spreadsheet information is clear. | | | |

| | | | |
|---|---|---|---|
| The spreadsheet application is accurate. | | | |
| The spreadsheet provides sufficient information. | | | |
| The spreadsheet provides up-to-date information. | | | |
| The information you need is provided in time from the spreadsheet. | | | |
| The spreadsheet provides reports/printouts that seem to be just about what you need. | | | |
| The spreadsheet application is easy to use. | | | |
| The spreadsheet is user friendly. | | | |
| The spreadsheet provides the precise information you need. | | | |
| The spreadsheet information content meets your need. | | | |
| You are satisfied with the spreadsheet application. | | | |
| The application is successful. | | | |

## Spreadsheet vs. Database Questionnaire

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| If you need to perform "what if" analyses, create:<br>▢a spreadsheet ▢a database | | | We don't do this kind of contrast in our workshops, but maybe this is an extension of what they've learned? Might be useful. -tkt |
| If you want data input controls to insure accuracy, create:<br>▢a spreadsheet ▢a database | | | |
| If you want the ability to change reports quickly, create:<br>▢a spreadsheet ▢a database | | +1 | This type of question can be a level of agreement question: SQL offers the ability to change reports quickly, or something like that, if that is a LO in the SQL lesson. -klj |
| If changes to data and relationships will be infrequent, create:<br>▢a spreadsheet ▢a database | | | |
| If the main need is to perform complex calculations, create:<br>▢a spreadsheet ▢a database | | | |
| If the intended use of the data isn't fully known, create:<br>▢a spreadsheet ▢a database | | +1 | Maybe the most important distinctions between spreadsheets and databases are 1) the ability to directly change the data as you're working with it 2) the abilty to quickly query and subset the data. We could have questions focused on those two things. |

## ~~Diagnostic Test for Spreadsheet Knowledge~~

~~See Appendix of this paper for the Diagnostic Test for Spreadsheet Knowledge. List the question number(s) below you think should be adapted/added to our pre/post assessment.~~

~~**Kari:** 2, 7, 24~~

~~Tracy~~

~~Erin~~

~~Jason~~

## Self-Efficacy toward OSS Activities

| Extremely disagree 1 | Disagree 2 | Neither agree nor disagree 3 | Agree 4 | Extremely agree 5 |
|---|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| I feel comfortable asking for help from the community using electronic communication means. | +1 | +1 | Using GitHub or using “something else.” -klj |
| I can write my doubts and understand answers in English. | | | |
| I am good in understanding code written by other people. | | | |

| | | | |
|---|---|---|---|
| I have pretty good skills to write and change code. | | | |
| I feel comfortable with the process of contributing to an Open Source project. | +1 | +1 | We don't get to this in our workshops -tkt |
| I think that contributing to an open source software project is an interesting activity. | +1 | +1 | Don't get to this either -tkt |
| I feel I can set up and run an application if a set of instructions is properly given. | | | |
| I am pretty good on searching for solutions and understanding technical issues by myself. | | +4 | I'd change the words "pretty good." -KLJ |
| I can choose an adequate task to fix if a list of tasks is given. | | | |
| I can find the piece of code that need to be fixed given a bug report presenting the issue. | | | |

## Computer User Self-Efficacy Scale

**Strongly disagree** **Strongly agree**

**1 2 3 4 5 6**

| Item | Keep | Adapt | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Most difficulties I encounter when using computers, I can usually deal with. | | | Overall I think a few of these question would be useful. I'm not immediately sure which ones are best though. -tkt |
| I find working with computers very easy. | | +2 | May be a good post assessment question: I found working with R/Python very easy. -klj<br>Don't like 'very easy', but something like this is useful. -tkt |
| I am very unsure of my abilities to use computers. | | +1 | Would have to understand implications of wording, but this and the above are similar just with different perspectives. I like this with a pre and post though to see if it's changed after the workshop. -tkt |
| I seem to have difficulties with most of the packages I have tried to use. | | | |
| Computers frighten me. | | | |
| I enjoy working with computers. | | | |
| I find that computers get in the way of learning. | | | |
| DOS-based computer packages don't cause many problems for me. | | | |
| Computer<br>s make me much more productive. | | +2 | Utilizing open source software makes me more productive. -klj<br>Like this one! -tkt |
| I often have difficulties when trying to learn how to use a new computer package. | | +1 | Good for pre -tkt |

| | | | |
|---|---|---|---|
| Most of the computer packages I have had experience with, have been easy to use. | | | |
| I am very confident in my abilities to make use of computers. | | +1 | Make use of open source software. -klj<br>“Make use of programming software to work with data” -tkt |
| I find it difficult to get computers to do what I want them to. | | | |
| At times I find working with computers very confusing. | | | |
| I would rather that we did not have to learn how to use computers. | | +1 | Interesting. I’m just sort of curious what the response would be here. Not sure we should use it though. -tkt |
| I usually find it easy to learn how to use a new software package. | | | |
| I seem to waste a lot of time struggling with computers. | | +1 | Again interesting -tkt |
| Using computers makes learning more interesting. | | +1 | Using OSS. -klj |
| I always seem to have problems when trying to use computers. | | | |
| Some computer packages definitely make learning easier. | | +1 | Open source software definitely makes learning easier. -klj |
| Computer jargon baffles me. | | | |
| Computers are far too complicated for me. | | | |

| | | | |
|---|---|---|---|
| Using computers is something I rarely enjoy. | | | |
| Computers are good aids to learning. | | +1 | “Computers are good aids to working with data”? -tkt |
| Sometimes, when using a computer, things seem to happen and I don’t know why. | | | |
| As far as computers go, I don’t consider myself to be very competent. | | | |
| Computers help me to save a lot of time. | | +2 | Level of agreement question: I believe using OSS will help me save a lot of time. -klj |
| I find working with computers very frustrating. | | | |
| I consider myself to be a skilled computer user. | | | |
| When using computers I worry that I might press the wrong button and damage it. | | | |

## Outcome Expectancy (Cloud Computing)

What are your expectations about cloud computing?

| Item | Keep | Adapt | Comments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Bad–good | | | These would just be fore the genomics lessons where we use cloud -tkt |
| Dislike–like | | | |
| Not convenient–convenient | | +1 | |
| Not superior–superior | | | |
| Few unique features–many unique features | | | |
| Difficult to use–easy to use | | +1 | |
| Poor service quality–good service quality | | | |
| Will not produce good benefits–will produce good benefits | | | |
| Low performance product–high performance product | | | |
| Lacks important benefits–offers important benefits | | | |

## Behavioral Intention (Cloud Computing)

Rate the probability that you would use cloud computing for your data analysis

| **Item** | **Keep** | **Adapt** | **Comments** |
|---|---|---|---|
| Unlikely–likely | | **+1** | |

| | | | |
|---|---|---|---|
| Non-existent–existent | | | |
| Improbable–probable | | | |
| Impossible–possible | | | |
| Uncertain–certain | | | |
| Definitely would not use–definitely would use | | +1 | |

## Learning Satisfaction (Cloud Computing)

| Extremely disagree 1 | Disagree 2 | Neither agree nor disagree 3 | Agree 4 | Extremely agree 5 |
|---|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| I like the idea of learning about cloud computing. | | | There aren't these learning satisfaction questions in other categories, but maybe rather than for a specific topic, we should have a couple for 'learning about computationally working with data'? -tkt |
| Learning cloud computing is a good idea. | | +2 | "Learning these skills (the workshop skills) is a good idea" -tkt |
| My learning experience with cloud computing is positive. | | +2 | |

| | | | |
|---|---|---|---|
| Overall, I am satisfied with cloud computing. | | | |
| My learning about cloud computing is pleasant. | | | |
| Learning cloud computing is enjoyable. | | | |
| As a whole cloud computing is effective for learning. | | | |

## Perceived Learning Effectiveness (Cloud Computing)

| Extremely disagree 1 | Disagree 2 | Neither agree nor disagree 3 | Agree 4 | Extremely agree 5 |
|---|---|---|---|---|

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| There is adequate resources and tools to learn cloud computing. | | | Similar 'perceived learning effectiveness' is a good framework for all the topics. -tkt |
| Cloud computing gives me chances to practice what I learn. | | | |
| My understanding of the basic elements of cloud computing have improved. | +2 | | If applicable. |
| I appreciate the important issues about cloud computing. | | | |
| I have learnt the fundamental aspects of cloud computing. | +2 | | If applicable. |

## Student-Instructor Relationship Scale

1 2 3 4 5 6 7

| Item | Keep | Adapt | Comments |
|---|---|---|---|
| I wish this instructor were more concerned with the welfare of students. | | | |
| I find it difficult to allow myself to depend on this instructor. | | | |
| The instructor is concerned with the needs of his or her students. | | +2 | “Was concerned”. -klj |
| I’m afraid that I will lose this instructor’s respect. | | | |
| I worry a lot about my interactions with this instructor. | | | |
| It’s not difficult for me to feel connected to this instructor. | | +1 | We talk about the instructor being accessible, so maybe this captures this a bit. -tkt |
| This instructor makes me doubt myself. | | | |
| I am nervous around this instructor. | | | |
| I find that the instructor does not connect well with students. | | +1 | Or this instead of the above -tkt |
| The instructor seems to only appreciate certain students. | | | |

| | | | |
|---|---|---|---|
| I feel comfortable sharing my thoughts with this instructor. | | | |
| I find it relatively easy to get close to this instructor. | | | |
| Sometimes this instructor's mood is unpredictable. | | | |
| This instructor shows favoritism to some students. | | | |
| This instructor seems uncomfortable interacting with students. | | +2 | The instructor/helper was comfortable interacting with students. -klj |
| I prefer not to show this instructor how I truly think or feel. | | | |
| It's easy for me to connect with this instructor. | | | |
| I get uncomfortable when instructors try to get too friendly with students | | | |
| I rarely worry about losing this instructor's respect. | | | |
| It makes me mad that this instructor does not seem to pay attention to the needs of his or her students. | | | |
| I am very comfortable feeling connected to a class or instructor. | | | |

| | | | |
|---|---|---|---|
| I'm scared to show my thoughts around this instructor; I think he or she will think less of me. | | | |
| I usually discuss my problems and concerns with this instructor. | | | |
| I don't feel comfortable opening up to this instructor. | | | |
| I'm afraid that if I shared my thoughts with this instructor that he or she would not think very highly of me. | | | |
| I'm afraid that if I shared my thoughts with this instructor that he or she would not think very highly of me. | | | |
| I do not often worry about losing the respect of this instructor. | | | |
| I find it easy to depend on this instructor for help. | | | |
| If I were to get into trouble in this class, I do not think this instructor would be very motivated to help me. | | | |
| I could tell this instructor just about anything. | | | |
| I feel comfortable depending on this instructor. | | | |
| I worry that I won't measure up to this instructor's standards. | | | |

| | | | |
|---|---|---|---|
| I worry that this instructor does not really care for his or her students. | | | |
| I prefer not to get too close to instructors. | | | |
| I often worry that my instructor doesn't really like me. | | | |
| If I had a problem in this class, I know I could talk to the instructor. | | | |
| I know this instructor could make me feel better if I had a problem. | | | |