

# JupyterHub for Teaching

Survey Results, Spring 2021

UW-IT began pilot testing a service for instructors interested in using JupyterHub with their students in winter 2020, just prior to the start of remote instruction due to COVID-19 restrictions. The service was offered to any UW instructor in autumn of the same year, and in spring 2021, we invited current users, 24 instructors and their students, to provide feedback on the service. Eleven instructors and 24 students (from five courses) responded.

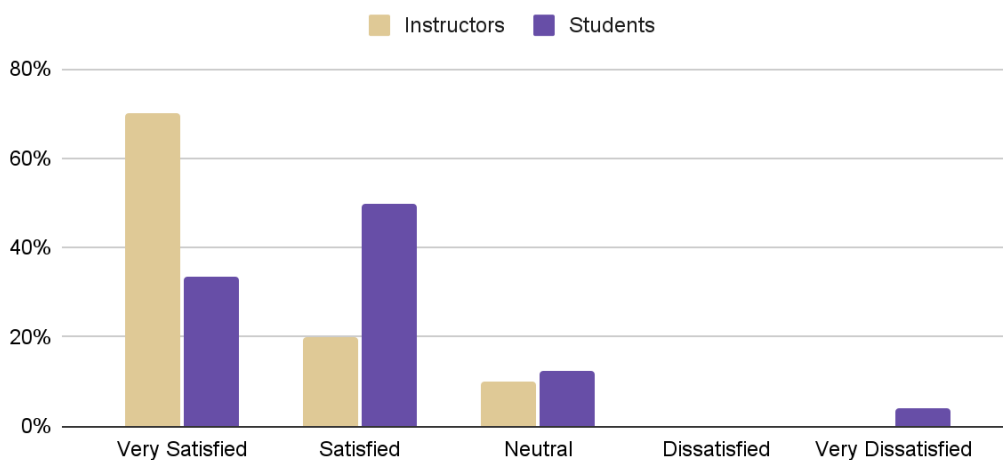
## Participants

In spring 2021, the JupyterHub for Teaching service was utilized in 28 courses that spanned a range of subject areas, most of them in STEM fields. Instructors responding to the survey taught courses in chemistry, physics, astronomy, electrical engineering, and data science, but also HCDE and Linguistics. The courses were 300-, 400-, and 500-level courses, and participants ranged from undergraduate students with little to no programming experience or familiarity with Python to graduate students with professional experience in software development. Most classes had an enrollment of 20-25 students, though enrollments varied from 11 students to 75.

## Satisfaction

The JupyterHub service appears to be both successful and broadly applicable: even with the range of course subjects, course levels, class enrollment, and programming experience of students, survey results were very positive: 9 out of 10 spring quarter instructors responding to the survey indicated that they were either “satisfied” or “very satisfied” with the service (see chart below). Students expressed a similar sentiment: Of the 24 students who responded to the survey, 20 (83%) reported that they were either “satisfied” or “very satisfied” with the service.

Satisfaction with JupyterHub Service



## Advantages

When asked to elaborate on the advantages of the service, instructors noted most frequently the standardized compute environment requiring no user set up and maintenance. Instructors appreciated the centralized software installation and management, noting how efficient it was to simply send students a link to JupyterHub. Also noted was how the service facilitated demonstrations in class; one instructor said they liked having a working setup that they could use without worrying about “messing up” their own computer. Another appreciated that the service was “private to UW, flexible, and free.”

*Huge advantage: a common, uniformly operating, and very useful programming environment. This service has completely changed, indeed made possible, the teaching of computation within these courses. – Instructor*

When asked what alternatives to the JupyterHub service they had considered for their classes, instructors mentioned IDE, installing Jupyter Notebooks/JupyterLab on student computers, local Python installation, Google Colab, Github Classroom, Kaggle, and remote RStudio.

Students were especially enthusiastic about the convenience and flexibility afforded by the JupyterHub service, noting how easy and efficient it made doing their work. Students appreciated the power afforded by the remote service and the fact that they did not have to install any programs on their own computers or worry about transferring files.

*JupyterHub makes it easy to work on programming assignments, since they are all hosted remotely and easy to access. There is a very intuitive interface—I can always devote all of my attention to my coursework because I never have issues with the server. I also appreciate that my instructors can publish assignments directly to JupyterHub and retrieve my completed work semi-automatically via git. – Student*

*I absolutely loved the flexibility it gave me. I did not have to do all my work on the same computer, since I could access the jupyterhub anywhere. I was also very pleased to have a backup of important files I was using for my project in [course] with the jupyterhub. – Student*

## Disadvantages

Eight of ten instructors also noted disadvantages, though these were individual to each respondent (and in some cases, requests for additional features). These included:

- Difficulty keeping packages from one session to the next
- A need for more compute resources for their particular assignments
- Clunky grading

- Installing packages outside of the standard install has to be planned in advance, limiting flexibility
- The service is only available online; if Internet is not available, students don't have an alternative
- The service ends for students at the end of the quarter

*Big disadvantage - JupyterHub service goes away after the quarter is over. Cannot be used in other classes that have not signed up for the service. The JupyterHub service should be available to all students to use in any class they want to use it in.*  
– Instructor

Of the 15 student respondents who reported disadvantages to the service, one third noted the lag they would experience when an entire class might be using it, or as it was starting up. Students also noted the inability to work with the service offline, with low internet connectivity, or in rare cases, when they might lose their internet connection entirely. One student mentioned that losing access to the service at the end of the quarter was a disadvantage, and another, who used a different instance for each of several courses, wanted to have one JupyterHub setup as a student in the department. A data science student wanted to be able to copy folders rather than single files to and from JupyterHub.

*If all of the class (roughly 30/40 people) tries loading JupyterHub at the same time, it lags terribly. Also, you can't copy an entire folder of files onto JupyterHub, or from it. You have to do it file by file, which is not convenient for data science, which is a common application of this resource.* – Student

## Next Steps

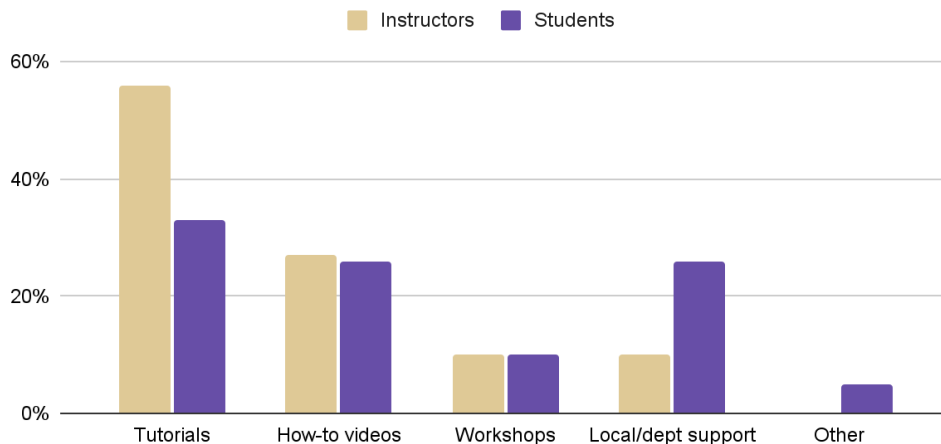
When asked if there were things they wanted to be able to do with JupyterHub in their classes but were unable to do, 6 out of 10 instructors responded, one repeating the need for more compute resources and the ability for students to keep new packages from one session to the next. Another noted an issue with connecting Python to hardware interfaces. Requests included:

- A simple version control and grading system
- A system to submit/collect homework assignments via JupyterHub
- A shared file system for things like data files (“similar to NFS mount”)
- A remote RStudio option (as a different service)

Asked the same question, almost all students (17 of the 19 who responded) said that there was nothing they wanted that they couldn't already do with JupyterHub. One student described a situation of running into errors and not knowing how to clear the output and restart the kernel. Another said they wanted to be able to load a folder full of documents without using the command line.

In its current state, documentation is not available to assist instructors and students in how to use JupyterHub. Survey participants were asked about the types of resources they would like to see made available to future users. Tutorials were most popular among both groups followed by how-to videos and, for students, local/departmental support.

### Desired Resources for Future Users



## Summary

Overall, survey results suggest that the JupyterHub for Teaching program has had a direct, positive effect on teaching and learning and is greatly appreciated by instructors and students. In addition, responses from users suggest that there are additional features, support resources, and new ideas for offerings that, if implemented, can increase the value of the service and its benefits to users.

*This is a FANTASTIC service w/o which we wouldn't have been able to get through remote learning over the past year -- kudos for deploying it!*  
– Instructor

*Do NOT, repeat, DO NOT take it away!! Tech support has also been excellent. Kudos to the team!* – Instructor

*This is a great service for educational purposes! Thank you for getting it!* – Student