



**Science
Societies**

Learning to appreciate fungi

New lesson plans hope to teach people what mushrooms do for the planet

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The important role fungi play as decomposers and even parasites is often understated in biology classes. A group effort by Michigan researchers outlined in the journal [*Natural Sciences Education*](#) makes mycology more available to teachers and students.

Mycology, the study of fungi, covers topics such as food safety and regulation, ecosystems, and the role mushrooms play in our environment. The lesson plans focus on:

- Mushroom identification and fungal ecology
- Mushroom growth and food safety
- Mushrooms as a renewable resource

Looking at taxonomy, ecology, food science, and economics through the lens of mycology is an engaging way to motivate students while potentially helping them earn a certification.

The goal of the project was to make new lesson plans about fungi for secondary school classes that could also be adapted to post-secondary or adult education. These lessons can help students identify species of wild fungi, including edible and poisonous varieties, while improving their taxonomy skills. It also teaches them food safety, sustainability, and renewable resources. The hope is that these lessons will be easily accessible, flexible, and engaging enough that educators can feel prepared to add fungi to their curriculum.

The lesson plans were aligned to the Next Generation Science Standards, the Michigan K-12 Science Standards, and career and technical education standards. The state of Michigan also has a goal to have 60% of working-age adults obtain a certification or college degree by 2030. The curriculum was designed with the Michigan Wild-Foraged Mushroom Certification Program in mind. Though it is made with Michigan in mind, this curriculum is relevant elsewhere, and the certification has reciprocity with some other Midwestern states.

There's money in mushrooms

In Michigan, certified mushroom foragers earn \$1,000 annually on average from morel sales alone, according to a 2022 study, with more potential income from other mushroom species. The certification helps students hoping to work in agriculture, food, and natural resources get a leg up in the business. These are the first lesson plans that aim to prepare students for the certification while improving their knowledge in various scientific fields.

Because fungi are notoriously difficult to study, these lesson plans were developed to make mycology more accessible to a wider audience and to prepare people for the Wild-Foraged Mushroom Certification Exam in Michigan. It does so by:

- Simplifying ways to describe, classify, and cultivate mushrooms
- Balancing technical terms with common ones



Certified mushroom foragers can bring in a decent income. Photo courtesy of Adobe Stock/[Cultura Creative](#).

- Keeping lectures brief and adaptable
- Creating fun and engaging student activities

Mycology covers issues such as water quality, food, medicine, nutrition, biofuel production, and forestry. It's incredibly important for agriculture, food, and natural resources because fungi are found almost everywhere and have a role to play in most natural environments. When we understand how fungi can help crops grow, it increases yields and brings down food costs.

An overlooked subject

Despite this, mycology can be overlooked in biology classrooms. Many students get fungi confused with plants in terms of their environmental roles. Most universities have individual units on mycology as part of botany or ecology classes, but very few have dedicated mycology classes. Peter J. Irga, a senior lecturer at the University of Technology Sydney, reviewed the course offerings at 11 universities in 2020 and found only one course focused on mycology, specifically medical mycology. It's possible that even the teachers themselves don't know how the fungal kingdom relates to biology, partially because it's taught so rarely. This project was designed to make mycology easier for educators and students alike.



Most universities have individual units on mycology as part of botany

or ecology classes, but very few have dedicated mycology classes. Photo courtesy of Flickr/Kathie Hodge. [CC BY-NC-SA 2.0](#)

European mycology professors María P. Martín and Roy Watling suggested that teachers take their students outside to go foraging for mushrooms before bringing

samples into the classroom to analyze. Students can learn how to collect, organize, photograph, and preserve specimens. Fungi play many different roles in our ecosystems—litter decay, wood decay, lichen and parasites, for example—and can easily lend themselves to classroom discussions.

Giving students an outside audience to validate their work is essential in many kinds of teaching and learning. Students can present on specific fungi and how they function in their ecosystems, which also hones their public-speaking abilities. Students can get involved through community science, which lets them share their data with people across the world through online programs and can even help real-world scientists stay updated on the biodiversity of specific regions. These databases also help them identify specific species of mushrooms. With all these tools in hand, students can become much more confident in their skills and recognize the value of fungi in our world.

The curriculum

The mycology curriculum has three main areas of focus, with lesson plans developed for each one:

- Lesson 1 focuses on mushroom identification and ecology
- Lesson 2 discusses mushroom growth and food safety
- Lesson 3 focuses on mushrooms as renewable resources

The lesson plans have directions for activities, alignment to standards, handouts, and links to Google Slide presentations and helpful online resources. There are also directions to grow mushrooms indoors and prepare mushrooms as food as well as information on the basics of cottage food law and common toxic mushrooms found in the Midwestern United States.

Lesson 1: Mushroom identification and fungal ecology

This lesson was designed for high school students and is best done in fall due to the sheer number of mushrooms that grow then though late spring also works. It uses mushroom forays as a team-building exercise to give students practical experience in the field while presenting info in Google Slides and giving students an identification game to help them practice. There are suggestions on how to adapt the lesson using flashcards if the class cannot forage outside. The lesson tasks students to:

- Locate the habitat of mushrooms
- Identify and describe the morphology of the fungi they find
- Obtain, analyze, and produce accurate data records
- Describe the ecological role of fungi such as parasite, decomposers, and mutualists

Lesson 2: Mushroom growth and food safety



Lesson 2 in the mycology curriculum includes instructions on how to cook

This lesson includes a Google Slides lecture that goes over general food safety;

mushrooms properly. Photo courtesy of Adobe Stock/[alexkich](#).

regulations on harvesting, processing, and

selling mushrooms; and tips for cooking mushrooms. It also includes classes of poisonous mushrooms and their side effects. The hands-on portion of this lesson includes using a mushroom grow kit to grow mushrooms in class and cooking them.

Students are taught to:

- Identify poisonous mushrooms
- Cook mushrooms properly
- Examine and summarize health, safety, and environmental regulations

Lesson 3: Mushrooms as a renewable resource

This lesson includes a Google Slides lecture on the laws and regulations around collecting wild mushrooms, how to forage sustainably, and how mushrooms are a renewable source.

The most important part of the lesson is on how fungi can be used for building materials, fabrics, packaging, food, medicine, and more. It gives students the opportunity to compare renewable products made with mycelium to traditional products, listing pros and cons. It incorporates a lifecycle analysis of the materials used. This lesson plan seeks to:

- Analyze and describe laws related to natural resource management and protection
- Explain how issues, trends, technologies and public policies impact society, the economy, and the environment
- Analyze pros and cons of renewable vs. non-renewable energy and products
- Review cost–benefit ratios for different plans

- Familiarize students with basic laws and best practices around mushroom foraging

To expand on this curriculum, teachers can write assessments, get help from industry professionals, and adapt the work for certification programs in other states. They could invite students to mushroom farms, invite guest lecturers into the classroom, have students try different kinds of mushroom, and see how mushrooms can help purify water. There are endless possibilities for courses such as these, and students and teachers alike can benefit immensely from learning more about the amazing world of fungi.

Dig deeper

Kratz, C., McKim, A., & Bonito, G. (2024). Mycology in the agriscience classroom: A curriculum based on wild foraged mushroom certification. *Natural Sciences Education*, 53, e70000. <https://doi.org/10.1002/nse2.70000>

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