PERSPECTIVES AND CURRENT DEBATES

**Using remote seminars to teach animal behavior**

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**Short title: Remote seminars and teaching**

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**Abstract**

In response to the COVID-19 crisis, numerous academic conferences and seminars were moved online. Some of them might establish themselves there permanently which offers an exciting opportunity for scientists, postdocs, and students to learn about research and improve networking. Remote (online) seminars are a good option to promote inclusion and diversity, allowing students worldwide to participate and to interact with researchers from a broad cultural and ethnic background. Capitalizing on our experience with the ongoing International Remote Seminar on Frontiers in Social Evolution (FINE), we propose four teaching tools that can be integrated into undergraduate and graduate courses and that can also be applied to most remote seminar series. We make recommendations for the use of: 1. Certified remote seminar attendance. 2. Relevant articles. 3. Teaching slides, and 4. Recorded seminars. Our aims are to promote and facilitate the use of the proposed teaching tools in Animal Behavior and related courses, and to encourage other remote seminar organizers to make teaching tools available.

**Keywords**: FINE, education, remote seminar, animal behavior, COVID-19, teaching, lecturer

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| **GLOSSARY****Credit:** Students have to accumulate “study credits” to finish their studies, or to be allowed to participate in exams. For example, European Credit Transfer (ECTs) and Accumulation System credit. 1 ECT corresponds to 25-30 hours of work.**Diversity:** Students and lecturers of different background, age, gender, sexual orientation, race, ethnicity, culture, religion, geography, disability, socioeconomic status, area of expertise, level of experience, thinking style, native language, or skill set (*sensu* Swartz et al. 2019). **FINE:** International Remote Seminar on Frontiers in Social Evolution. A remote seminar that offers life participation in talks of 45 minutes plus 60 minutes discussion via Zoom and YouTube. All talks and discussions are stored on YouTube and available for later viewing and re-viewing: <https://www.youtube.com/channel/UClXFO1pLpCTBy7vSwLWH-GA> **Learning:** The acquisition of new understanding, knowledge, skills or attitudes by students. It can be promoted and facilitated by the teaching approach and philosophy of lecturers.**Lecture:** Any activity where teaching is done by lecturers, including modules, classes, labs, and practicals.**Lecturer**: Anybody who teaches, including but not restricted to teachers, instructors, and professors.**Program:** a set of educational activities that lead to a degree like bachelor, honors, masters, doctorate.**Remote Seminar:** Seminar that is held on any video communication platform. It mainly refers to seminars which store the presented talks permanently on video platforms, making them available for later viewing and re-viewing.**Student:** A person enrolled at a university to obtain a degree, including PhD students. However, the term could be viewed even more broadly to include any learner, from school level to established researchers, and teaching suggestions outlined here could be adapted accordingly to the appropriate level. **Teaching:** The term is used in the broadest sense, including 'front-of-class' teaching (whether remotely or live on campus) and more interactive approaches (seminars, workshops, labs), as well as more student-led, self-directed approaches where the lecturer only acts as a guide or facilitator. The term focuses on the perspective of the lecturer, trying to promote learning by students.**Teaching activity:** Activity by students to facilitate learning, e.g., reading, discussing, note taking, writing a summary or essay, interviewing a scientist.**Teaching tool:** A resource made available (here from remote seminars) that can be used by lecturers to develop specific teaching activities. Examples are stored videos or available teaching slides.**University:** Refers to all institutions of higher education. |

1. **INTRODUCTION**

The abrupt transition to remote learning necessitated by the COVID-19 crisis has created numerous challenges for university lecturers (see Glossary; Bao 2020; Barton 2020; Elsalem et al. 2021; Hughes et al. 2021). At the same time, this transition has produced new and creative educational opportunities, many of which are just beginning to be realized. Notably, increased use of digital platforms to convene research seminars in a wide range of disciplines has revealed the ease with which large, international communities of colleagues can be brought together to share information and resources that readily lend themselves to use in instructional contexts (Wood & Duchesneau 2021; Zipple & Lange 2021; e.g., animal behavior: Table 1; cell biology: Botchkarev 2020; human behavior: <https://www.human.cornell.edu/pam/research/hehbad/virtualseminars>; neurobiology: <https://www.world-wide.org/Neuro/>; see Bottanelli et al. 2020 for a comprehensive list). Additionally, numerous departmental seminar series have been shifted to remote platforms (e.g., <https://eeb.ku.edu/spring-2021-seminars>). Such remote (online) seminars create important opportunities for students to explore established and emerging research in a dynamic, discovery-based format that can be tailored to fit a diverse array of instructional levels, learning objectives, and institutional settings. Ease of international participation by both presenters and audience promotes diversity in research and reduces barriers to access while facilitating new educational and research collaborations.

Here, we illustrate how remote seminars can be used in teaching. Our aims are (i) to show lecturers in animal behavior what teaching tools, derived from remote seminars, are already available and (ii) to inform organizers of remote seminars what teaching tools they can make available for lecturers. As an example, we describe a series of teaching activities that we have developed in concert with the International Remote Seminar on Frontiers in Social Evolution (FINE) which started in September 2020 (Wood & Duchesneau 2021). Originally conceived as a forum for sharing research, it quickly became apparent that the FINE and other remote seminars offer critical learning opportunities for students. To capitalize on these opportunities and to share these resources more broadly with lecturers of animal behavior courses, we outline multiple ways in which students can engage with remote seminars to increase understanding of key behavioral concepts, improve skills associated with critical evaluation of behavioral research, and promote clearly written and verbal communication of primary research findings. For this - as for any teaching - it is important to first define learning outcomes, describe the proposed tools, and illustrate how these tools can be integrated to the classroom. As terminology in higher education differs between countries and institutions, we provide a glossary of terms we use.

1. **LEARNING OUTCOMES**

Students from all levels may benefit from remote seminars in three domains of cognitive (learning-knowledge), psychomotor (skills) and affective (attitudes and values) (*sensu* Bloom et al. 1956). The depth at which the suggested teaching activities may be used to facilitate these learning outcomes should be contingent upon students’ level, prior knowledge and the depth of the learning experience (Cannon & Feinstein 2005).

* 1. **Knowledge**

This domain considers the question “*What do we want students to know?*” This domain encompasses facts, terminology, principles, models, and theories (Vaughan 1980). Remote seminars and their associated teaching tools may contribute to these various areas of knowledge. For example, several remote seminars (Table 1) addressed concepts in animal behavior, ecology and evolution, and the process of doing science using natural history observations, experimental manipulations in the field or laboratory, comparative approaches, and analytic models or simulations.

* 1. **Skills**

This domain addresses the question “*What do we want students to be able to do?*” The domain of skills encompasses techniques for critical thinking, problem solving, and communication (Conklin 2005). Remote seminars give students the opportunity to observe a range of scientific methodologies in action and thus, to identify the question, hypotheses and experimental design used by the presenter, as well as learning to interpret graphs and tables. In lectures, students may then be required to work in teams to evaluate the science being presented and perhaps propose alternative hypotheses or experimental designs. By participating in a discussion period with an invited speaker, students can develop skills for formulating and asking questions. Additional activities may require students to communicate with each other, or to prepare a presentation based on a given teaching tool, which would further enhance their communication skills.

* 1. **Attitude**

This domain is concerned with affective learning and how to change the students’ attitudes and values, in this case, towards science. In the context of the proposed remote seminar tools it addresses the questions: “*What do we, as researchers, want students to think or care about?*” and “*How do we as researchers engage students in developing their own attitudes and values as future professionals?*”. Within the domain of attitude we can also expect students to develop awareness towards ethics, morals, and the practice of these values in one’s professional and everyday life (MacLean & Cahillane 2015). Remote seminars provide examples of real-world scientists communicating research they are passionate about. The seminars should also inspire an appreciation for evidence-based arguments while illustrating the various ways scientific problems can be approached (e.g., field and comparative research, modeling). Additionally, the seminars exemplify the importance of science communication, typically done to peers, but may also inspire the need to communicate science to the general public. Finally, by involving international researchers of different backgrounds, accents, and experiences and showcasing their research done across the world, remote seminars promote diversity, stimulate discussion on the ethics of working in different countries, and highlight the scientific and cultural advantages of building teams with collaborators of diverse backgrounds.

* 1. **Networking**

In addition to the core learning domains, using teaching tools derived from remote seminars in the classroom (for details see below) will allow students to expand on other professional skills that will aid their career advancement (Turnbull & Gotian 2020). Remote seminars provide a safe environment where students at different levels, especially those in early career stages, can build their confidence to participate in discussions and interact with peers. Also, attending live seminars gives students networking opportunities, particularly when engaging in the discussion with speakers. During the discussion, students can practice two important skills needed to develop and maintain a professional network: how to be an active listener and how to ask questions. Mastering these skills empower honest and enduring interactions with colleagues that can result in a fruitful network.

1. **TEACHING TOOLS EMERGING FROM REMOTE SEMINARS**

Here, we describe how remote seminars can be used for teaching and how teaching tools similar to those produced by FINE can be developed (Table 2). Details of tools developed by the FINE community are described in Box 1.

**3.1 Remote seminar attendance**

Historically, participation in seminars or conferences has been treated by many universities like enrolling in a course. For example, in many countries PhD students have to obtain credit points during their studies; participating in a seminar can contribute to this. Still, it may be difficult for students to prove that they have participated in a remote seminar. Organizers of remote seminars can provide certificates of attendance if they can verify that students participated. One way is to check at every seminar the list of participants, which can be time consuming if seminars are attended by large audiences. This can also be challenging for a seminar organizer while hosting a speaker if they are taking steps to ensure the seminar progresses without technological issues or interruptions (e.g., unmuted microphones by audience members in noisy areas). Thus, another possibility to verify participation is to ask students to submit written summaries of the seminars they attended within 24 hours of the seminar (see Supplementary Material S1). The responsibility of reviewing the summaries and verifying student participation could fall on the course lecturer or the student’s research advisor. However, reading some of the summaries could inform the seminar host and speaker of student insights and questions, leading to improvements in the individual speaker’s talk and the entire seminar series.

**3.2** **Relevant articles**

Reading and discussing the primary literature can have numerous intellectual and personal benefits to students (Kozeracki et al. 2006). Reading articles related to a seminar prior to watching it can improve one’s general understanding of a speaker’s research theme, reducing energy spent trying to understand terms and key points during the seminar and helping generate better informed questions. These benefits are amplified when members of research groups or journal clubs discuss papers together prior to seminars (Glazer 2000). Remote seminar organizers can facilitate these activities by asking speakers to provide bibliographical information for several relevant articles and making this information available to seminar participants before the seminar, such that students and lecturers can prepare themselves.

**3.3** **Teaching slides**

Presentations in seminars, including those online, are typically 45-60 minutes long, limiting their use in the classroom. Furthermore, extracting the take home messages from long seminars requires considerable effort from the lecturer. To facilitate the use of remote seminar presentations in the classroom, presenters can prepare sets of teaching slides that are made available to the scientific community. Such teaching slides will contribute to disseminating the ideas and results of seminar presenters to future generations of scientists. Presenters could be encouraged to record themselves explaining the content of the slides. Together with a photo of the researcher on the title slide, this brings the international expert directly into the classroom, making it a more personalized experience for students. The audio portion can be muted, or deleted, from the presentation if the lecturer prefers. Providing students access to slides and audio recordings (via platforms such as Blackboard or Canvas) will increase accessibility to students with limited ability to attend seminars and promote the review of relevant course information outside of class. Providing captions improves accessibility to students with hearing impairments.

**3.4** **Recorded seminars**

It is common practice that remote seminars are recorded and stored on video-platforms (e.g., Zipple & Lange 2021). This enables lecturers to show the seminars (or part of them) during class, or to require viewing them as an assignment to be completed at home. Several teaching activities can then be associated with these recorded seminars, like discussions among students, writing summaries, or using the seminars to produce new activities (e.g., grant proposals, interviews with speakers). Several remote seminars in animal behavior are live streamed and freely accessible on specific YouTube channels (Table 1), though other video platforms might also be possible (Bottanelli et al. 2020).

Recorded seminars can also be used to generate student-led discussions during lectures that normally would be dedicated to in-person laboratory or field activities. Lecturers can invite remote seminar speakers to join the discussion after students have watched the seminar. Students can prepare for a discussion with the remote seminar speaker by writing a summary and preparing a few questions about a related article. They can ask the speaker questions about the seminar, the speaker’s career path, and related academic issues. The benefits are numerous; students improve their understanding of research, learn how to interact with international scientists, improve their confidence, and develop their networking skills.

1. **SCIENCE COMMUNICATION**

While known before, the COVID-19 pandemic has highlighted the importance of science communication skills (Kelp & Hubbard, 2021), and indeed, there has been a call to integrate science communication more fundamentally into any science programs (Dahm et al., 2019). Within some biological programs, students can choose to take science communication lectures. In addition, various universities now either encourage students to gain work-based experience, or even have this as a requirement in the curriculum. For example, the University of Derby, UK, runs a final year undergraduate module taken by students in programs ranging from Biology and Zoology, to Human Biology and Forensic Sciences. As part of the assessment, students have to create a public facing video of about 3 minutes in length. Students can freely choose the topic, as well as the target audience. Such assignments could also be included in a variety of undergraduate and graduate animal behavior courses. For example, engaging deeply with the content of the seminar will increase their understanding of principles of behavioral ecology. There are clear positive benefits not only to the recipients but also the creators of science communications or outreach activities (Clark et al., 2016). Organizers of remote seminars could offer to publish videos of high quality on their homepages and YouTube channels (for an example see <https://www.youtube.com/watch?v=iKKHQwT-cuQ>). The prospect of creating a video that will be actually publicly available and have a "stamp of approval" by established scientists could act as an incentive to produce coursework of the highest standard as it will increase their employability.

**5 RECOMMENDATIONS**

A key feature of many remote seminars is that they can be adapted to suit the needs of a wide range of courses, ranging from introductory to advanced undergraduate and graduate classes.

This is true for many different countries (Table 3). Lecturers can choose teaching tools and teaching activities based on numerous factors including their own course learning outcomes, method of lecture (e.g., in person, asynchronous or synchronous online), class size, course level (e.g., undergraduate, graduate), format (e.g., lecture, discussion), and students’ access to resources. As such, remote seminars offer quality and flexibility for learning in a changing world. For example, in introductory courses, students can be introduced to key concepts and hypotheses using teaching slides provided by remote seminar speakers. These activities can be followed by class discussion, or written summaries, of the key points. In upper-level courses (see Box 2 for a detailed example the implementation of FINE teaching tools), students can explore topics further after watching an entire remote seminar. Explorations can include visiting a speaker’s website, writing grant proposals, or summarizing additional papers by the speaker. We encourage lecturers to create the combination of activities that best suits their goals, including developing exercises of their own that stem from remote seminar presentations.

The expansion of remote seminars and other remote means of scientific discussion (e.g., virtual conferences) during the COVID-19 pandemic has increased accessibility of novel research to a diversity of students from around the world (Skiles et al. 2020; Estien et al. 2021). Thus, remote seminars have the potential to improve the diversity of the animal behavior community (Lee 2020; Tang-Martinez 2020; Hughes et al. 2021). However, this is not enough. Remote seminar organizers and their respective communities need to share teaching tools with their professional networks. For example, the FINE community consists of >300 individuals, including students and lecturers at various career stages, from >25 countries over 5 continents. The FINE organizers have shared FINE teaching tools with the FINE community and the organizers of other remote seminar series (Table 1). These efforts have increased engagement with students and provided opportunities for professional development for early career animal behaviorists from around the world.

Remote seminars can be used to connect students and lecturers across states (or provinces) and countries, promoting national and international lecturer-student and student-student networks. For example, lecturers can facilitate journal clubs involving multiple research groups during which their students discuss the relevant articles prior to watching remote seminars. These joint journal clubs could be informal, or part of formal student training programs, such as grants that support international student research (e.g., U.S. National Science Foundation International Research Experiences for Students). As is the case for FINE, other seminar organizers could organize virtual, individual meetings with speakers and members of their research groups before and after seminars. Likewise, we recommend that remote seminar organizers allow time for extended discussion immediately after a seminar (e.g., FINE involves up to 1 hour of recorded discussion, often followed by informal discussion among some participants). Our experience is that these extended discussions allow the diversity of attendees to participate, including students, while providing important feedback to speakers. Finally, we encourage lecturers to work with their respective universities to encourage cross-listed courses that allow students from multiple institutions to engage in remote seminars together. Ultimately, these ways of connecting students and lecturers could promote international collaboration, and provide novel ways of teaching and informing animal behavior research.

**6 CONCLUSIONS**

Remote seminars give international lecturers and students free access to leading scientists in their field. When these seminars are stored on video-platforms, then this resource is permanently available. Students that previously had limited, or no access, to international conferences can now have weekly access to international experts. Using recorded remote seminars in teaching can be particularly beneficial to undergraduate students when presenters join discussions. Such interactions can humanize scientists, broadening the impact of their science and increasing student interest in scientific endeavors and careers. Given their obvious educational value, we think it will be beneficial if such collaborative international remote seminars persist after most universities return to live instruction of students. We encourage organizers and lecturers to think creatively on how to incorporate remote seminars in classes, discussion groups, and university seminar series. Doing so will increase access of cutting-edge science and researchers to a wide audience and promote a broader participation in scientific endeavor.

**CONFLICT OF INTEREST**

The authors declare no conflict of interest.

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**TABLE 1.** Examples of remote seminar series and other video channels related to studies in animal behavior that emerged during the COVID-19 pandemic. Series are listed in order of the first seminar was launched.

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| --- | --- | --- | --- |
| **Full name** | **Platforms** | **First seminar** | **Continuation** |
| Evolution & Ecology Seminars (EvoEcoSeminars) | YouTube / Slack | 15 April 2020 | At least until 2021 |
| Long-Term Animal Research Seminar Series | YouTube | 12 May 2020  | Ended December 2020 |
| International Remote Seminar on Frontiers in Social Evolution (FINE) | Zoom / YouTube | 1 September 2020 | Fall 2021 and Spring 2022 series in planning, to be continued. |
| Animal Behavior Society | YouTube | 8 October 2020 | To be continued. |

**TABLE 2.** Different teaching tools and how remote seminar organizers can make them available for lecturers, who then develop different teaching activities

|  |  |  |  |
| --- | --- | --- | --- |
| **Teaching tool** | **Action by organizer of remote seminar** | **Examples of teaching activity by lecturer** | **How to access the tool** |
| Online seminar attendance | Provide certificate of participation upon request and attendance | Students sign up and participate in remote seminar, receive credit. | Students sign up for attending a remote seminar (supplementary material S1) |
| Relevant articles | Request that presenters provide bibliographical information for 2-3 relevant articles.  | Students read and discuss articles, write summaries. | Available for free download on homepage1 |
| Teaching slides | Request that presenters make important slides available. | Include in lecture; provide online and ask for summary. | Available for free download on homepage1 and ResearchGate2 |
| Recorded seminar | Store recorded seminar on a video platform | Summaries, discussion, essay, invite speaker.Creation of scientific communication material. | YouTube page of FINE3 |

1https://www.socialevolutionseminar.com/portfolio-3/project-two-f6cnw 2https://www.researchgate.net/project/FINE-Teaching-Slides-for-Social-Evolution

3 https://www.youtube.com/channel/UClXFO1pLpCTBy7vSwLWH-GA

**TABLE 3.** Potential use of FINE teaching tools in countries where the authors have been recently employed

|  |  |  |  |
| --- | --- | --- | --- |
|  | Teaching slides | FINE recording | Live FINE Attendance |
| Argentina | In Behavioral Ecology, Animal Behavior, and Zoology courses at the Licenciatura level | Specialized seminars, most likely for graduate students  | PhD students  |
| Canada | In Introductory Biology or Animal Behavior courses | Specialized seminars on social evolution | MSc or PhD students from research groups working on related topics |
| Colombia | In Ecology and Zoology courses for undergraduate students.  | Behavioral Ecology undergraduate and graduate students.  | MSc and PhD students  |
| Ecuador | Elective courses on social evolution, or behavioral ecology, for Licenciatura or MSc degrees | Elective courses on social evolution, or behavioral ecology, for Licenciatura or MSc degrees | (to our knowledge not easily implemented) |
| France | Teaching biology bachelor level | Master 2 students | PhD students |
| Germany | Teaching biology bachelor level  | Teaching biology master level  | PhD students |
| South Africa | Teaching biology bachelor and 4th year (honours) levels | Teaching biology bachelor and 4th year (honours) levels | (to our knowledge not easily implemented in formal teaching) |
| Switzerland | Teaching biology bachelor level  | Teaching biology master level  | PhD students |
| UK | Teaching biology bachelor level | Teaching biology master level | (to our knowledge not easily implemented in formal teaching) |
| USA | Teaching biology at bachelor’s and Master’s level | Teaching biology at bachelor’s Master’s and PhD levels | Teaching biology at Master’s and PhD levels |

**BOX 1. FINE teaching tools**

**Teaching slides**: FINE presenters are invited to submit up to two sets of teaching slides, each consisting of a title slide, three slides with results and figures, and a conclusion slide (Supplementary Material S2 for instructions to FINE presenters). These teaching slides are most often created in using Powerpoint; this allows the lecturers to modify them to their specific teaching needs. While the level of complexity of slides is determined by the FINE presenter, lecturers can still adjust the slides for teaching students of different levels. FINE presenters are encouraged to record themselves explaining the content of the slides.

FINE teaching slides are available for free download on the FINE homepage https://www.socialevolutionseminar.com/portfolio-3/project-two-f6cnw and sometimes on the homepages of the individual presenters. Additionally, many FINE teaching slides are available on ResearchGate and can be accessed from the project “FINE teaching slides for social evolution” (<https://www.researchgate.net/project/FINE-Teaching-Slides-for-Social-Evolution>). By following this project, lecturers will be notified when new slides become available.

**Relevant articles**: The FINE organizers request that speakers provide a summary and bibliographical information for three articles related to their seminar which the organizers make available to the FINE community before the seminar. Relevant articles are made available to the general public on the FINE homepage (<https://www.socialevolutionseminar.com/portfolio-3/project-two-f6cnw>).

**Remote seminar attendance**: For the FINE 2021 spring series, the requirement was for students to submit a minimum of three key-points from each talk. Interestingly, all students in the series submitted much longer and more detailed summaries, indicating their commitment and learning achievements. To verify attendance, it is not necessary for the organizers to mark the summaries. This tool could be further developed by local lecturers who could then give more credit to students; for example, lecturers could give their students detailed instructions on what kind of syntheses they have to submit after each seminar to qualify for study credit points. We encourage remote seminar series to develop a way to certify participation, stating explicitly the requirements for obtaining a certificate (see Supplementary Material S1). The latter would give university officials information they can use to decide whether the certificate merits credit study points.

**Recorded seminars:** Recorded seminars can also be used to generate student-led discussions during lectures that normally would be dedicated to in-person laboratory or field activities. Lecturers can invite remote seminar speakers to join the discussion after students have watched the seminar. Students can prepare for a discussion with the remote seminar speaker by writing a summary and preparing a few questions about a related paper. They can ask the speaker questions about the seminar, the speaker’s career path, and related academic issues. The benefits are numerous; students improve their understanding of research, learn how to interact with international scientists, and develop their networking skills. For example, multiple authors of this paper have already invited FINE speakers to engage with students taking their undergraduate behavior courses (detailed example in Box 2).

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| **BOX 2. Using FINE teaching tools in a behavioral ecology course**In 2021, the lead author (Hayes) used the FINE seminar to promote inquiry-based learning and discussion by 3rd and 4th year undergraduate and Master’s students (Supplementary Material S3) who were taking his remote, behavioral ecology course. During the academic term, the students engaged with ten recorded FINE seminars on the FINE YouTube page. Student engagement involved multiple steps (Figure 1). First, the students wrote 200-word summaries and three questions (emphasizing Tinbergen’s 4 questions; Tinbergen 1963) about an article provided by the FINE speaker in a journal. Students then watched a recorded seminar together during the first hour of a three-hour class session. Next, the students discussed the seminar topic. For eight out of ten lectures, the speaker joined the discussion via zoom for 45-60 minutes, answering questions about the science and process, as well as their career path. This activity not only promoted inquiry-based learning, but also developed student confidence and ability to interact with leading scientists. To facilitate an inclusive discussion, Hayes moderated the session, calling on students who had a question. If speakers did not join the discussion (two of the 10 lectures), students watched 15-20 minutes of the recorded discussion among FINE participants following the seminar, after which they engaged in discussion with Hayes. After watching the seminar, the students added two layers to their summaries – (i) 2-3 themes of the seminar, written for a non-scientist and (ii) final thoughts and outstanding questions. Altogether, the summaries for each FINE seminar were one-page in length, requiring that students write succinctly. At the end of the academic term, the students wrote a synopsis of the FINE seminars, an activity that emphasized students’ abilities to synthesize information. Instructions to students taking Hayes’ course are posted at the FINE website (https://www.socialevolutionseminar.com/portfolio-3/project-four-2lsaj).  Student feedback played an important role in the process. In response to verbal student feedback, Hayes changed the organization of the three-hour session. Subsequently, students first discussed a relevant article, preparing them for the seminar. The students then watched the seminar after which they engaged in discussion with the speaker or Hayes. We encourage such flexibility; responding to student suggestions improved the learning process in this class.  **FIGURE 1.** Flow of activities used in Hayes’ Behavioral Ecology course for 3rd and 4th year undergraduates and Masters’ students. |

**SUPPLEMENTARY MATERIAL**

**S1. Example of FINE instructions for students who want to obtain a certificate of participation. This information is sent to FINE subscribers before onset of the next term.**

**FINE Participation Certificate for Students**

*At some universities, students can obtain study credit for participation in a seminar or conference. FINE offers a certificate of attendance to students to apply for such credit at their home university.*

*Please note: FINE is a non-profit initiative, fully developed and implemented by those who volunteer their time. There is currently no grant support and no participation fees are required. FINE offers free access to seminars, teaching tools, and can provide certificates of participation to students. The organisers are not legally obliged to present these services and cannot be held responsible for doing so. We ask that you please follow the instructions below to obtain the certificate of participation. Failure to follow the instructions will result in not receiving the certificate.*

**How to register for a certificate:** Send an email to social.evolution.seminar@gmail.com with your name and your affiliation (the name of your university). Please note: The information will be imported using copy / paste exactly how you formatted it. Registration must be completed one day before the new FINE seminar series starts (e.g.  the 1st of March 2021 to register for the 2021 spring term that starts March 2nd). Late registrations will not be processed.

**What do I have to do to obtain a certificate?**

* You have to register to the mailing list of FINE (you can do this while signing up for a certificate).
* You have to attend the seminars live.
* A minimum of 10 seminars per term must be attended.
* During the seminar, take notes.
* Immediately after each seminar, submit a short summary by email of the seminar you just attended live. Provide a minimum of three key points you have drawn from the presentation. The notes will not be marked.

**DEADLINES:**

Registration: 1st of March 2021

Submission of summary: The Wednesday after the seminar you attended at 6 AM Paris time. We think it is easier to complete the summary right after attending the seminar and send it.

**Certificate:** The certificate will state how many FINE presentations you attended (e.g., attended 12 out of 16 FINEs in spring), that each presentation had a duration of 1 hour plus 1 hour discussion, and that you sent in summaries you attended. See template below.

**When do I get the certificate?** Certificates will be sent to you via email at the end of June 2021.

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**S2. Instructions for FINE presenters how to prepare teaching slides**

**Opportunity to prepare FINE teaching slides**

As FINE organisers, we offer all presenters the opportunity to make available for the scientific community teaching slides they may prepare for university students. We understand that preparing teaching slides requires substantial additional work by the presenters; and we would like to stress that preparing the slides is an option, not a requirement related to the invitation to present. We do believe that such teaching slides will contribute to spreading the ideas and results of FINE presenters to our colleagues who may choose to use those slides in their teaching, as well as to their students who constitute the next generations of scientists studying social evolution. **[One example of teaching slides can be found here.](https://www.researchgate.net/publication/348923335_Ecological_constraints_and_reproductive_competition_Audio_slides_for_teaching)**

In the future, the organisers will provide the scientific community with teaching tools, which will be made available for free on the FINE homepage (*url to be included in March when available*). The teaching slides will be available for free download. We encourage presenters to additionally make the teaching slides available on other platforms such as ResearchGate (see below) and their own websites.

Every presenter has the opportunity to prepare up to two sets of teaching slides, a given set contributing to one of three different categories of learning topics:

* A concept (for example “floater”, “social flexibility”, “social system”, “cooperative breeding”).
* A case study (for example an experiment or analysis of long-term data).
* A study system (for example social spiders or meerkats).

While a combination of these three categories is possible, we request that every set of teaching slides will be identified as belonging into one of the categories. This will make it possible to provide them for download at the appropriate section of the FINE homepage.

**Instructions on how to prepare the teaching slides:**

* *Title slide: Photo and name of FINE presenter, title of the presentation, and date it was given. If available, the link to the YouTube video (if not available, we might insert it later). If you use audio-slides (see below), then quickly introduce yourself.*
* *Three slides about the concept, case study, or study species.*
* *One final slide with a clear take home message / conclusions.*
* *The FINE presenter determines the level of complexity (for which level of studies it is).*
* *The FINE presenter can choose the language for the slides, English or any other language*
* *Please name the file as follows “topic\_name”, for example “IVSO\_SCHRADIN”.*
* *We recommend PowerPoint as the format to use as it allows lecturers to modify the slides for their needs, but other software / format such as PDF etc. can be used.*

**Audio-slides or normal PowerPoint (PPT) presentation**

Slides can be done in PowerPoint or a similar software. Presentations can be submitted as simple slides or as audio slides (i.e., with recorded speech). Audio slides have the advantage that they bring the expert into the classroom. As such, students will not only learn about studies by the experts, but also listen to them, making it a more personal experience. To record audio in PowerPoint, simply choose the option “[Insert Audio” and then “Record Sound” or use the function “Record Slide Show](https://support.microsoft.com/en-us/office/video-add-and-record-audio-eeac1757-5f20-4379-95f2-0d0cd151d5b8)”. The lecturers using these slides then have the option to either use your recorded speech or not (for example in case they do not use all of your slides). This is the reason why we recommend submitting PPTs with recorded audio (which lecturers can modify to their needs, including muting or deleting audio) and not video-recorded short presentations (using zoom or other software) which results in files the lecturers cannot modify to their individual needs.

**Notes**

You are welcome to include notes / references explaining your slides in the appropriate section.

**FINE homepage**

The teaching slides are available at https://www.socialevolutionseminar.com/portfolio-3/project-three-w79m7

**ResearchGate (optional)**

This is an option for FINE presenters that do have a ResearchGate account. [We created in ResearchGate the project “FINE teaching slides for social evolution”.](https://www.researchgate.net/project/FINE-teaching-slides-for-social-evolution) Please follow this project on ResearchGate. When you are on the project page, click on “References” to see all available slides.

We will add you to the project when you agree to prepare some teaching slides. Unfortunately, the settings in ResearchGate only allow to add collaborators that follow each other. Thus, to be added to the project you would have to follow “Carsten Schradin” on ResearchGate. Ones added to the project, you can add your slides to it. Whenever anybody adds to this project, it will appear in the home tread of his / her followers, some of which will then go to the project page and also find the slides of all previous contributors.

To add your slides: Upload them in ResearchGate under “presentation”. Once uploaded, go to “research items”, “Presentations”, and under the upload you will see the option “Add to project” (you have to join the project before you can contribute to it).

Best,

Carsten, Loren & Eduardo

**Examples**

<https://www.researchgate.net/publication/348923335_Ecological_constraints_and_reproductive_competition_Audio_slides_for_teaching>

<https://www.researchgate.net/publication/348972881_Intra-specific_variation_in_social_organization?ev=project>