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Exploring Pedagogical Approaches: A Comparative Analysis of Information Delivery Methods in Fish Dissection Instruction

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Abstract

The Covid-19 pandemic prompted a global shift to remote work and education, challenging traditional teaching methods. This research explores the effectiveness of audiovisual versus visual-only guides in teaching perch dissection anatomy, safety, and procedure. The study involves a cross-sectional experiment with students from an Introduction to Biology course at Bowling Green State University. Participants were divided into groups using either a video or a written guide, and their knowledge was assessed before and after the dissection. Results calculated through a Student’s t-test indicate no significant difference in overall effectiveness between the two methods, apart from labeling an anatomy diagram and in answering questions about dissection procedure. Future research should also consider incorporating actual dissections as assessments to compare effectiveness with these remote options. While this study may not conclusively determine the optimal method, it emphasizes the importance of adapting teaching strategies in the evolving landscape of remote learning.
1. INTRODUCTION

The advent of the Covid-19 pandemic brought about profound global changes. To curb the spread of the disease, individuals found themselves confined to their homes, prompting a shift to online platforms for both education and work. Despite the easing of stay-at-home mandates, numerous businesses opt to maintain remote or hybrid models, citing enhanced productivity and cost-cutting benefits (Silvermann). Educational institutions now offer remote alternatives for certain courses even as in-person options resurface (U.S. Government Accountability Office). This irreversible transformation necessitates educators to diligently explore optimal online solutions for remote learners. While video telecommunication platforms like Zoom, Discord, or Microsoft Teams prove effective for lecture-based classes, practical courses pose a unique challenge. Notably, disciplines like biology, which rely on hands-on exercises and experiments, present a significant hurdle in the realm of remote education.

As the demand for remote work grows, a crucial inquiry arises: what format would be most beneficial for students? This research project aims to address this specific issue through an experiment comparing the retention of information in an audiovisual experience versus a solely visual one. The central research question revolves around whether students are more likely to remember details about perch dissection anatomy, safety, and procedure through a video presentation or a written and illustrated handout. The initial hypothesis suggests that an audiovisual experience, featuring real videos of student-led dissections, would be more engaging
and consequently more memorable. Adding a distinctive element to the project, both the video footage and illustrations are products of student work, showcasing dissections that differ markedly from professional ones. The incisions may appear ragged, organs might be nicked, and the process may be notably prolonged. This uniqueness lies in presenting amateurish work, providing students with a realistic perspective of what their own fish dissections could resemble, facilitating easier comparison.

II. REVIEW OF LITERATURE

Of all biology lab exercises, specimen dissection is a particular highlight for its specific need for alternatives. Students who object to dissection on conscientious grounds (or equally valid squeamishness) have, by law, a right to learn anatomy alongside their fellow students. Research into alternative, hands-off versions of these labs have shown that students working with non-animal teaching methods (NAMs) to be as, if not moreso, effective in science education compared to their practical counterpart (Zemanova & Knight, 2021). NAMs, which may include models, mannequins, computer simulators, videos, and virtual reality, have been used in the classroom since the 1960s, are proven to work, and yet even now fail to replace in-person dissections as the dominant teacher of animal anatomy. Why?

One study points to the attitudes of the professors. Dr. Miriam A. Zemanova (2022) conducted a survey on high school teachers in Switzerland to ask their opinion on dissection and its alternatives. The majority of respondents stated that they believed that dissection was a valuable part of teaching biology and was of great interest to students. While 52% stated that they would be
willing to use an alternative, the overall opinion (even among that 52%) was that animal-free alternatives were inferior teaching tools, potentially expensive (in actuality, alternatives can be cost-saving because they can be reused as opposed to constantly sourcing new animals), and that the teachers lacked the time or money to invest in experimental methods. Another reason cited by these teachers was, interestingly, peer pressure. There seems to be a dogma surrounding dissection as a teaching tool that is difficult to escape, even in the face of evidence that alternatives may also be effective, depending on one’s metric of effectiveness. The camp in favor of traditional dissections may not be clinging to the past, irrationally, however.

In his 1962 article “Live Animals in Teaching,” James G. Bosse eloquently argues that “one cannot become a biologist or doctor in a library any more than one can learn how to swim without water.” This was of course written in an era where alternatives were largely limited to books, but the philosophy is defensible. To what extent can a young person learn how to do something without actually doing it? Lord (1990) adds in his article the importance of gaining dexterity with laboratory tools and developing strong spatial-visual perception. Not to mention the disconnect between “simulation” and “reality—assuming commonly-accessible virtual reality does not reach mind-boggling realism with the inclusion of tactile sensation and smell, there is no true replacement for real dissection. A student may reach the university level or beyond only using simulations for her veterinary degree, only to learn far too late that she does not have the stomach to operate on an actual cat. Offner (1993) has just that objection, emphatically arguing that
squeamishness should be overcome instead of encouraged, or else proper biology simply is not taught.

The opinions of professors and scholars are important, of course, but one can’t discount the students themselves. In 2022, Mark Sarvary and his team conducted a survey with 350 undergraduate students who had taken a fully remote lecture and laboratory biology class. In terms of preference, students tended to prefer online lectures, but in-person labs— an opinion shared even among those who had never taken an in-person college course. In an older study specifically related to dissection, one group of students used a computerized frog dissection while the other dissected an actual frog. In terms of learning outcomes, the two groups showed no statistical difference, but either group claimed that the method they used was what they would have preferred (Sarvary et al., 2022). Additionally, both groups had a positive opinion on in-person dissection. However, this particular study took place in 2007, so the simulation technology would have been quite different from that of today.

Another study addressed the matter of emotional experiences in students. Lisa-Maria Kaiser and her team studied self-reported emotional responses to student dissection of a mammalian eye between watching a video and using an anatomical model versus conducting an actual eye dissection. Survey questions gauged student levels of interest, boredom, disgust, and overall well-being. The results, on a 0 to 4 scale, were roughly similar between the two groups, but the video/model was viewed as less disgusting but more boring. Conversely, the actual dissection evoked more disgust but also more interest (Kaiser, et al., 2023). One cannot discount factors like
student boredom and interest, as they are the footholds to creating scientists of tomorrow. Zemanova and Knight may have established that non-animals methods are educationally effective, but test scores and fact retention are not substitutions for fostering a genuine passion for anatomy. I mention this debate between dissection methods not to argue in favor of a particular side, but because any experiment related to dissection alternatives would be remiss not to mention this decades-long controversy.

To return to the actual project at hand, the subject used will be yellow perch. Perch are considered an “intermediate-level” animal by Carolina Biological Supply– more complex than the earthworm or crayfish, but less so than a rat or pig (“Dissection Buying Guide). Perch are generally dissected in middle school, but such labs can also be found as early into one’s education as the fifth grade (Iwama, et al., 2010), and as late as the undergraduate level in college (“Biology 220”). Yellow perch make for excellent fish dissection subjects because they are widely distributed through the northern continental United States and much of Canada, certainly in Ohio, with such proximity to the Great Lakes. They are a species of least concern and are unlikely to have their populations threatened by mass laboratory use (Brown, et al., 2009). Interestingly, despite this experiment being set in Northern Ohio, only five out of the 69 undergraduate study participants reported having dissected bony fish in the past. This was an unexpected boon to the study, however, as it meant much of the information presented in the study was at least somewhat new to the participants.

The ultimate goal of this study is the assessment of learning outcomes for both student groups. If the group with the written guide scores higher, it can be said that the traditional written
word and drawn diagrams, like most textbooks, are more effective for fact retention. If the video
guide scores higher, then audiovisual stimulus is more valuable. Which is more likely to be the case?

In a 2010 article titled “Is It Still Considered Reading? Using Digital Video Storytelling to
Engage Adolescent Readers,” author Ginger Malin introduces the pitfalls associated with the
traditional written word in education and potential alternatives. In her study, Dr. Malin introduces
a multimodal (that is, visual, oral, and written) method of conveying a short story to high school
students in the form of an annotated video of a dramatic reading as opposed to simply reading the
text. Overall, the majority of the students watching the video claimed higher engagement, felt more
prepared for classroom discussion on the text, and were more likely to claim they enjoyed the
experience (Malin, 2010). However, engagement with a short story is not the same as fact retention.

One MIT study used participants at MPI’s 2018 World Education Congress to specifically
determine learning outcomes in reading versus video (Nelson, 2022). Participants were asked to
identify what method they would find most valuable, but whether they were in a video or reading
group was randomized. Ultimately, the test results on the information both groups were exposed to
were not statistically different. Notably, however, the participants who were in a learning group
aligned with their preferences scored ten percent higher than their peers (Nelson, 2022). This
suggests the validity of “learning styles,” another subject of high debate in the educational world. In
direct opposition to the concept, Dr. Paul Kirschner argues that not only is the concept of “learning
styles–” in which a person may better retain information visually, auditorially, and so on–
scientifically unsupported, but in fact a problematic myth (2017). That certainly seems to be the case in my research, wherein scoring differs very little between visual and audiovisual groups.

III. METHODS

To determine what method for learning fish dissection is most effective, a one-time cross-sectional study was conducted with students taking the Introduction to Biology course (or BIOL 2040) at Bowling Green State University. These students participated voluntarily in exchange for extra credit in their class. The students were gathered from two sections of the class with different professors—initially whether the students were in the Video Guide group or the Written Guide group were determined by class section, but was later randomized under the possibility that differing professors may affect pre-existing knowledge or learning outcomes. All participation was conducted online via learning management system Canvas, and the responses corresponding to specific students were known only to the principal researcher—the professors of BIOL 2040 only received a list of participants at the end of the semester eligible for extra credit. The student’s assessment scores did not correlate to the amount of extra credit received.

The experimental design was a pretest-posttest, in which all students had to complete an assessment before and after viewing their fish dissection guide, found in Appendix A. This series of questions, apart from Question 10, were designed to assess the student’s knowledge of three different categories: Anatomy, Procedure, and Safety. Questions 1 and 2 ask students to specifically consider why goggles and properly-fitted gloves would be important for this lab, beyond the fact that they are required. Questions 3, 4, and 5 assess knowledge of the lab’s procedure and dissection
inquiry—ways to “figure out,” for example, that a particular structure is the esophagus. Questions 6 and 7 test student’s recall of anatomical structures unique to fish, and 8 and 9 test recognition of structures when provided a visual and a word bank. For labeling the diagrams, students were provided a list of body parts to match to each letter, some of which are decoys (trachea, spiracles, lung, etc.) to prevent students from using the process of elimination. The final question is asked to determine what level of experience the participant may have had prior to this study. However, because it qualified as a personal inquiry and not a direct test of the material, this question had to be optional.

After completing the pre-assessment, students were able to view their study materials, which either consisted of a written document with illustrations (see Appendix D) that provided a step-by-step guide of a perch dissection, or a video showing a dissection with a narrated guide (see Appendix E). Students from both groups were encouraged to take notes and spend as much time reviewing as they wished.

After treatment, the student groups had to complete the same assessment again. The only difference was that Question 10 was replaced, asking the participants’ opinion on the use of student dissections for the materials. Again, because they did not directly test the participant’s knowledge, these questions were optional.

The assessments were completed asynchronously over the course of three weeks at the pace of the participant’s, using any electronic device of their choosing.
Participant scores were confidential. The open-ended questions, including “Procedure,” “Safety,” and “Specific Anatomy,” were either scored as “Correct,” “Partially Correct,” or “Incorrect,” with partially correct answers (those that leave out critical details or are only technically true) receiving 0.5 points. Questions that required correctly matching structures on a diagram were scored on the number of correct matches, with 26 possible total points. These scores were then assessed for improvement pre-and-post test, compared across treatment groups, and analyzed via Student’s $t$-test.

IV. RESULTS

Respondent Data

In addition to the assessment questions, participants were also asked their opinion on the “amateurish” materials they were given—either illustrations of a student-performed dissection, or video footage of a student conducting a dissection. Specifically, they were asked if the materials would have been helpful as a guide for a real, hands-on dissection.

The overall response to the presence of the “botched” illustrations was positive (see Table 3 in Appendix B), with the most common comments stating that it would be helpful to see what to do and what not to do in a dissection. A lesser percentage were of mixed opinion, with a variety of comments including being unsure or apparently confused by the question.

The video group was much more divided. Those who believed the amateur dissection was helpful stated that it was more relatable and gave students a better idea of what to expect. Those
against it stated a professional dissection would have a cleaner, easier to understand specimen and more insight. Several students mentioned that a side-by-side comparison of an amateur and professional dissection would be valuable.

**Statistical Data**

The statistical significance of each result was calculated using Student’s $t$-test, comparing the differences in scores before and after treatment between the two groups. As shown in Tables 2 and 3 of Appendix C, all scores in both groups showed a statistically significant score improvement, save for the “Procedure” section in the Written group. The reason for this aberration is unknown. In terms of scoring difference between Written and Video Groups, Table 1 of Appendix C shows only the Anatomy Diagram section of the assessments showed a significant difference. The critical $T$-value for the anatomy diagram is unlike the others, because some participant data was not usable due to technical failure in displaying the diagram images, changing the number of degrees of freedom.

From this data, the initial hypothesis that a video guide would be more effective for remotely teaching dissection is unsupported. Both groups, overall, were equally successful in teaching the material to their respective groups. Additionally, students that reported having no past experience in dissection did not show significantly different score improvement compared to those who reported some experience (see Table 4 in Appendix C).
V. DISCUSSION

From these results, the use of a video or written guide seems to be largely irrelevant. These findings are consistent with the 2018 study conducted by MIT, suggesting that audiovisual learning does not necessarily increase a student’s likelihood of retaining short-term information for an assessment (Nelson, 2018). One standout, however, were the differing scores for the anatomy diagram, as the Written Guide group was more likely to have higher scores than the Video Guide counterparts. This is very likely due to the fact that the materials for the Written Guide group show the exact labeled diagrams that are used for the pretest and posttest, allowing a perfect one-to-one comparison. The Video Guide group, however, only viewed a video of a true-to-life dissection with no diagrams. This is pure conjecture, but it is likely the Video Guide group would have likely scored higher if they were given actual pictures to identify fish instead of an illustrated diagram, since this would be closer to their frame of reference.

It is important to note that these assessments do not necessarily test the participant on how much or how well they learned. The majority of students completed the pre-assessment, viewed the materials, and completed the post-assessment within the same 12 hours. More than anything else, the scores reflect the participants’ short term recall and note-taking ability. A follow-up on the same participants a certain period of time to test how much of the material they retained would be valuable for future studies.

Lastly, while this experiment was designed to determine the “best” remote alternative to a hands-on dissection, future experiments may do well to include an actual dissection as the final
assessment alongside answering the preliminary questions, as a way to assess how closely either method may prepare a student for such a lab. Inevitably, should a student’s interest in anatomy lead to a career in that field, for example in veterinary sciences or biological research, an actual dissection will eventually need to be done. If this is not possible at the student level for any reason, educators have a responsibility to prepare that student as much as possible by whatever method most closely teaches the information and skills of dissection. These results suggest that in terms of pencil-and-paper assessment, the delivery method of that information is unimportant.

As the means by which we work and study continue to change, educators at every level must recognize those changes and decide when to adapt, and when to stay the course. As the realities of remote learning continue to unfold, more studies like this one will be necessary to determine how best to bring out the next generation of biologists, veterinarians, medical professionals, and the myriad other careers that require an intimate understanding of anatomy.
Biology 220: biology lab-Liberty University. (n.d.)

https://www.coursehero.com/sitemap/schools/2433-Liberty-University/courses/6375805-BIOLOGY220/


https://doi.org/10.2307/4439990


U.S. Government Accountability Office. (2022, August 9). *Back to school for college students is shifting from campuses to online.* [https://www.gao.gov/blog/back-school-college-students-shifting-campuses](https://www.gao.gov/blog/back-school-college-students-shifting-campuses)
Online offerings have been offered online.

[https://doi.org/10.3390/ani11010114](https://doi.org/10.3390/ani11010114)

[https://doi.org/10.3389/feduc.2022.892713](https://doi.org/10.3389/feduc.2022.892713)
Appendix A

Pre-and-Post-Assessment Questions Given To Participants

1. Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)

2. Why is it important to wear gloves that properly fit?

3. How might you confirm that you’ve identified the fish’s esophagus?

4. When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)

5. Why might it be helpful to remove your fish’s operculum before dissection?

6. The fingerlike projections attached to the stomach are called the: _____________________

7. What purpose does the swim bladder serve?

8. Match the structures to their letter. Some may not be used, and some may be used more than once.

9. Match the structures to their letter. Some may not be used, and some may be used more than once.
10. (Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?
### Appendix B

*Summary of Participant Responses and Participant Test Scores*

#### Table B1: Percentage of Correct Responses in the Pre-Assessment

<table>
<thead>
<tr>
<th></th>
<th>Anatomy (Diagram)</th>
<th>Anatomy (Specific)</th>
<th>Procedure</th>
<th>Safety</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Video Group</strong> (26 respondents)</td>
<td>38.2% (149/390)</td>
<td>36/5% (19/52)</td>
<td>43.6% (34/78)</td>
<td>49.0% (25.5/52)</td>
<td>39.8% (227.5/572)</td>
</tr>
<tr>
<td><strong>Handout Group (44 respondents)</strong></td>
<td>41.1% (421/1024)</td>
<td>34.2% (33.5/98)</td>
<td>52.7% (69.5/132)</td>
<td>44.9% (44/98)</td>
<td>42.0% (568/1352)</td>
</tr>
</tbody>
</table>

#### Table B2: Percentage of Correct Responses in the Pre-Assessment

<table>
<thead>
<tr>
<th></th>
<th>Anatomy (Diagram)</th>
<th>Anatomy (Specific)</th>
<th>Procedure</th>
<th>Safety</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Video Group</strong> (26 respondents)</td>
<td>70.0% (269/390)</td>
<td>76.0% (39.5/52)</td>
<td>48.1% (37.5/78)</td>
<td>(75.0% (39/52)</td>
<td>67.3% (385/572)</td>
</tr>
<tr>
<td><strong>Handout Group (44 respondents)</strong></td>
<td>90.0% (922/1024)</td>
<td>68.4% (67/98)</td>
<td>60.6% (80/132)</td>
<td>67.3% (66/98)</td>
<td>83.9% (1135/1352)</td>
</tr>
</tbody>
</table>

#### Table B3: Participant Opinions on the Amateur Dissections in Illustrated and Video Groups

<table>
<thead>
<tr>
<th>Were the “botched” illustrations helpful?</th>
<th>Were the “botched” fish helpful?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes (34.6% (9/26))</td>
</tr>
<tr>
<td>No</td>
<td>No (30.8% (8/26))</td>
</tr>
<tr>
<td>NR/Mixed</td>
<td>NR/Mixed (34.6% (9/26))</td>
</tr>
</tbody>
</table>

Figure B4: Blank Scorecard
Pre-Assessment scores are shown first, assessment scores are shown second

Anatomy: Labeling _/26, Specific Structures _/2
Procedure: _/3
Safety: _/2

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- Why is it important to wear gloves that properly fit?
- How might you confirm that you’ve identified the fish’s esophagus?
- When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- Why might it be helpful to remove your fish’s operculum before dissection?
- The fingerlike projections attached to the stomach are called the: _____________________
- What purpose does the swim bladder serve?
- External Structures ________
- Internal Structures________

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

(Optional–If in the written procedure group) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

(Optional–If in the video group) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

Figure B5: Illustrated Procedure Results

STUDENT 1
Anatomy: Labeling 8/26 (26/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (3/3)
Safety: 0.5/2 (2/2)
Short Answer Scores:
• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(C) Why is it important to wear gloves that properly fit?
• (I)(C!) How might you confirm that you've identified the fish's esophagus?
• (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the: ______________________
• (C)(C) What purpose does the swim bladder serve?
• (4/13) (13/13) External Structures
• (4/13) (13/13) Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

None

(NR) (Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

STUDENT 2
Anatomy: Labeling 9/26 (22/26), Specific Structures 1/2 (2/2)
Procedure: 1.5/3 (2.5/3)
Safety: 1.5/2 (1.5/2)
Short Answer Scores:
• (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (C)(C) Why is it important to wear gloves that properly fit?
• (I)(PC) How might you confirm that you've identified the fish's esophagus?
• (C!)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (PC)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: 
  ______________________
- (C)(C) What purpose does the swim bladder serve?
- (6/13) (13/13) External Structures
- (3/13) (9/13) Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have had no prior dissection experience.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

They were kinda useful. Yes, for a real hands-on dissection it would have been useful because sometimes just knowing why something's wrong and how it was achieved is helpful for the next time.

STUDENT 3

Anatomy: Labeling 10/26 (26/26), Specific Structures 0/2 (2/2)
Procedure: 1.5/3 (3/3)
Safety: 0/2 (2/2)
Short Answer Scores:
C (correct)   PC (partially correct)   I (incorrect)   NR (no response)
- (I)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(C) How might you confirm that you've identified the fish's esophagus?
- (C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (PC)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:
  ______________________
- (I)(C) What purpose does the swim bladder serve?
- (8/13) (13/13) External Structures
- (2/13) (13/13) Internal Structures
Optional What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Frog dissection in 8th grade

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

STUDENT 4

Anatomy: Labeling 3/26 (25/26), Specific Structures 0/2 (0/2)
Procedure: 1/3 (0.5/3)
Safety: 0/2 (0/2)

- (I) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (NR) The fingerlike projections attached to the stomach are called the:

- (I) What purpose does the swim bladder serve?
- (I) Why is it important to wear gloves that properly fit?
- (I) How might you confirm that you’ve identified the fish’s esophagus?
- (PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (PC) Why might it be helpful to remove your fish’s operculum before dissection?

External Structures _3/13 (12/13)
Internal Structures__0/13 (13/13)

(NR) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

(NR) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

STUDENT 5

Anatomy: Labeling 13/26 (24/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (3/3)
Safety: 0.5/2 (1/2)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(I) Why is it important to wear gloves that properly fit?
- (I) (C!) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

- (C)(C) What purpose does the swim bladder serve?
- External Structures 7/13 (13/13)
- Internal Structures 6/13 (11/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have not had dissection experience but I have assisted in the filleting of catfish while camping.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade

Yes the dissection illustrations all felt necessary, helpful and engaging in the following along of dissection procedure.

STUDENT 6

Anatomy: Labeling 9/26 (26/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (2.5/3)
Safety: 1/2 (1.5/2)

- (C)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(C) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the: _______________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures 7/13 (13/13)
• Internal Structures 2/13 (13/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Yes, a sheep’s eye

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

No, they did not follow the procedure correctly.

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STUDENT 7
Anatomy: Labeling 5/26 (24/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (2/3)
Safety: 0.5/2 (1.5/2)

• (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(PC) Why is it important to wear gloves that properly fit?
• (I) (C) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(C) The fingerlike projections attached to the stomach are called the: _______________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures 5/13 (12/13)
• Internal Structures 0/13 (11/13)
What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a cat and I thought that peeling the skin was difficult and took a while

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think that they would not be that helpful

STUDENT 8
Anatomy: Labeling 5/26 (24/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (0/3)
Safety: 0.5/2 (1/2)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(PC) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures 5/13 (11/13)
- Internal Structures 0/13 (13/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Very little. I have dissected worms in class.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade
Yes I think they could have done better if they were able to do a hands on dissection.

STUDENT 9
Anatomy: Labeling 5/26 (26/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (2.5/3)
Safety: 0.5/2 (2/2)
  ● (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
  ● (C)(C) Why is it important to wear gloves that properly fit?
  ● (C) Why might you confirm that you’ve identified the fish’s esophagus?
  ● (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
  ● (PC)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
  ● (I)(C) The fingerlike projections attached to the stomach are called the: __________________________
  ● (C)(C) What purpose does the swim bladder serve?
  ● External Structures 13/13 (13/13)
  ● Internal Structures 13/13 (13/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

n/a

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

no, they had the wrong size gloves on and made a bad first incision, also didn’t show them cutting off the operculum which makes it easier to cut

STUDENT 10
Anatomy: Labeling 5/26 (24/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (1/3)
EXPLORING PEDAGOGICAL APPROACHES

Safety: 0.5/2 (2/2)
- (I)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: ________________________
- (C)(C) What purpose does the swim bladder serve?
- External Structures 7/13 (11/13)
- Internal Structures 2/13 (13/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I did a shark dissection in either 6th or 7th grade but I don’t remember anything from it other than the bad smell

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think initially it would be most helpful to focus on what the organs should look like, then after learning that discuss how organs may look when cut during improper dissections

STUDENT 11

Anatomy: Labeling 13/26 (26/26), Specific Structures 0/2 (2/2)
Procedure: 1/3 (2/3)
Safety: 1.5/2 (2/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(I) The fingerlike projections attached to the stomach are called the: ________________
• (C)(C) What purpose does the swim bladder serve?
• (C)(C) Why is it important to wear gloves that properly fit?
• (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?

External Structures 7/13 (13/13)
Internal Structures 6/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

“I have had a lot of dissection experience in my biomedical classes in high school. I’ve dissected a g twice, a cow eye, a sheep brain, and a sheep kidney. The eye was difficult.”

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think they would be helpful.

STUDENT 12
Anatomy: Labeling 16/26 (26/26), Specific Structures 1/2 (1/2)
Procedure: 1.5/3 (1/3)
Safety: 1.5/2 (2/2)

Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(I) The fingerlike projections attached to the stomach are called the: ________________
• (C)(C) What purpose does the swim bladder serve?
• (C)(C) Why is it important to wear gloves that properly fit?
• (PC)(PC) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
● External Structures 9/13 (13/13)
● Internal Structures 7/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Biology and Anatomy & Physiology in high school. Worm, grasshopper, crayfish, cats, fetal g, possibly more but I don’t remember. Not really I enjoyed dissecting.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

It was weird. I don’t think they would have been helpful but maybe someone else would have.

STUDENT 13
Anatomy: Labeling 9/26 (26/26), Specific Structures 0/2 (1/2)
Procedure: 2.5/3 (0.5/3)
Safety: 2/2 (2/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I(incorrect)  NR (no response)
● (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (I)(I) The fingerlike projections attached to the stomach are called the:
● (I)(C) What purpose does the swim bladder serve?
● (C)(C) Why is it important to wear gloves that properly fit?
● (C)(PC) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (PC)(I) Why might it be helpful to remove your fish’s operculum before dissection?
● External Structures 7/13 (13/13)
● Internal Structures 2/13 (13/13)
(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Cow's eye, 2 sheeps heart, I think a g's liver, a frog, a cat, and an lily.

Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

It was good to see what not to do but a little confusing if ur trying to remember after not looking at material for a longer period of time vs a shorter period of time.

STUDENT 14

Anatomy: Labeling 9/26 (26/26), Specific Structures 0/2 (2/2)

Procedure: 3/3 (1/3)

Safety: 2/2 (2/2)

Short Answer Scores:

C (correct) PC (partially correct) I (incorrect) NR (no response)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

- (C)(C) What purpose does the swim bladder serve?
- External Structures 7/13 (13/13)
- Internal Structures 8/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?
I’ve dissected a heart and a fetal pig. Some things found difficult where understanding the right steps when it came to more complex structures like the fetal pig and knowing the best techniques.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection? I think it’s a good way of showing students what to avoid. I think it would be helpful for a real dissection.

STUDENT 15
Anatomy: Labeling 11/26 (24/26), Specific Structures 1/2 (1/2)
Procedure: 2/3 (1.5/3)
Safety: 1/2 (1.5/2)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (C)(C) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures 9/13 (12/13)
- Internal Structures 2/13 (12/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Cow eye. No real challenges

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection? Waiting for grade

yes
STUDENT 16

Anatomy: Labeling 10/26 (15/26), Specific Structures 0.5/2(1/2)
Procedure: 1/3 (2/3)
Safety: 1.5/2 (2/2)

- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the:

- (PC)(C) What purpose does the swim bladder serve?
- External Structures 10/13 (12/13)
- Internal Structures 0/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have had zero dissection experience.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I believe that the "botched" images were rather helpful. They provided me with a right vs. wrong. However, I think that these diagrams would have been more helpful had they provided instructions on what to do and what not to do.

STUDENT 17

Anatomy: Labeling 7/26 (21/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (1.5/3)
Safety: 1.5/2 (1.5/2)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(NR) The fingerlike projections attached to the stomach are called the:

_____________________

- (C)(C) What purpose does the swim bladder serve?
- External Structures 4/13 (12/13)
- Internal Structures 3/13 (9/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I’ve dissected a frog and a worm in a middle school class

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade

I think it’s very hard to learn without actually doing the dissection yourself.

STUDENT 18
Anatomy: Labeling 14/26 (26/26), Specific Structures 1/2 (2/2)
Procedure: 2/3 (2/3)
Safety: 1.5/2 2/2)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C)(C) Why is it important to wear gloves that properly fit?
- (C)(I) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
● (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
● (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________
● (C)(C) What purpose does the swim bladder serve?
● External Structures 9/13 (13/13)
● Internal Structures 5/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a cat when I took A&P II with BGSU. It was fairly simple aside from needing to cut through some tendons which was very difficult.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I didn't see any botched illustrations in the dissection procedure.

STUDENT 19
Anatomy: Labeling 11/26 (25/26), Specific Structures 0/2 (1/2)
Procedure: 1/3 (2/3)
Safety: 1/2 (0/2)

● (PC)(I) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (I) (I) Why is it important to wear gloves that properly fit?
● (I)(I) How might you confirm that you've identified the fish's esophagus?
● (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
● (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
● (I)(I) The fingerlike projections attached to the stomach are called the:

_____________________
● (I)(C) What purpose does the swim bladder serve?
● External Structures 6/13 (12/13)
● Internal Structures 5/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected an earthworm in 6th grade.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Yes they would be extremely helpful.

STUDENT 20

Anatomy: Labeling 13/26 (26/26), Specific Structures 0.5/2 (2/2)
Procedure: 2/3 (2/3)
Safety: 0.5/2 (1.5/2)

● (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (I) (C) Why is it important to wear gloves that properly fit?
● (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
● (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

● (PC)(C) What purpose does the swim bladder serve?
● External Structures 7/13 (13/13)
● Internal Structures 6/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a cat, a pig heart, a sheep brain, and a cow eye. Nothing was really difficult about it, I just didn't necessarily like doing them.
(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade

Yes, I think it seems pretty clear.

STUDENT 21

Anatomy: Labeling 13/26 (22/26), Specific Structures 0.5/2 (2/2)

Procedure: 2/3 (1.5/3)

Safety: 0.5/2 (1/2)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(PC) Why is it important to wear gloves that properly fit?
- (I) (I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (PC)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (C)(C) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures 10/13 (13/13)
- Internal Structures 1/13 (9/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

two years ago I dissected a sea anemone, dogshark, skate, oyster, crawfish, and maybe one or two other marine species. I was really bad at identifying the organs. They all look so similar.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Yah. I benefit the most from visual work, so seeing a dissection process before doing one would be helpful.
STUDENT 22

Anatomy: Labeling 8/26 (26/26), Specific Structures 1/2 (2/2)

Procedure: 1.5/3 (2/3)

Safety: 1/2 (2/2)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I) (C) How might you confirm that you've identified the fish's esophagus?
- (C)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (PC)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures 6/13 (13/13)
- Internal Structures 2/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected a frog my sophomore year in high school.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection? Possibly

STUDENT 23

Anatomy: Labeling 8/26 (26/26), Specific Structures 1/2 (1/2)

Procedure: 3/3 (2.5/3)

Safety: 1/2 (1.5/2)
EXPLORING PEDAGOGICAL APPROACHES

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (C)(PC) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the: __________________________
- (C) (C) What purpose does the swim bladder serve?
- External Structures 5/13 (13/13)
- Internal Structures 8/13 (13/13)

(NR) (Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

(NR) (Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

STUDENT 24
Anatomy: Labeling 7/26 (26/26), Specific Structures 1/2 (2/2)
Procedure: 2/3 (2.5/3)
Safety: 0.5/2 (1.5/2)

- (PC) (C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(PC) Why is it important to wear gloves that properly fit?
- (C) (PC) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: __________________________
- (I)(C) What purpose does the swim bladder serve?
- External Structures 5/13 (13/13)
- Internal Structures 2/13 (13/13)
(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

None

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I believe they would have been helpful if the dissection was hands on.

STUDENT 25
Anatomy: Labeling 7/26 (26/26), Specific Structures 1/2 (1/2)
Procedure: 2/3 (2.5/3)
Safety: 0.5/2 (2/2)

- (PC) (C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C) (C) Why is it important to wear gloves that properly fit?
- (I) (PC) How might you confirm that you’ve identified the fish’s esophagus?
- (C) (PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I) (C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I) (I) The fingerlike projections attached to the stomach are called the:

_____________________

- (C) (C) What purpose does the swim bladder serve?
- External Structures 6/13 (13/13)
- Internal Structures 7/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Frog, Sheep eye/heart/brain, cat

The only difficulties I experienced was cutting into the feline- the fur made it difficult to determine if the incision was correct.
(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

They are very helpful! Ever dissection will vary, even in the slightest ways. It is helpful for students to understand different possible outcomes and to see where they stand.

STUDENT 26
Anatomy: Labeling 7/26 (25/26), Specific Structures 1/2 (2/2)
Procedure: 2/3 (2/3)
Safety: 0.5/2 (2/2)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC) (C) Why is it important to wear gloves that properly fit?
- (I) (I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

- (C)(C) What purpose does the swim bladder serve?
- External Structures 8/13 (12/13)
- Internal Structures 5/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected 2 fish, one bony and one was a skate.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Yes.
STUDENT 27
Anatomy: Labeling 6/26 (26/26), Specific Structures 0/2 (2/2)
Procedure: 1/3 (2.5/3)
Safety: 0.5/2 (1.5/2)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I) (C) Why is it important to wear gloves that properly fit?
- (I)(C) How might you confirm that you've identified the fish's esophagus?
- (C)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: ______________________
- (I)(C) What purpose does the swim bladder serve?

External Structures 4/13 (13/13)
Internal Structures 2/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected a pig and cat. They were both difficult, but the cat was harder.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection? Yes I think a guide would have been more helpful to show exactly what was needed to be done, an example.

STUDENT 28
Anatomy: Labeling 21/26 (20/26), Specific Structures 2/2 (2/2)
Procedure: (2/3) (0/3)
Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)

The fingerlike projections attached to the stomach are called the:

What purpose does the swim bladder serve?

Why is it important to wear gloves that properly fit?

How might you confirm that you've identified the fish's esophagus?

When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)

Why might it be helpful to remove your fish's operculum before dissection?

External Structures 11/13 (12/13)

Internal Structures 10/13 (8/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have never dissected anything. During my 6th grad year in junior high we dissected frogs but I was absent that day.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I feel they would do as the please and not follow instructions. I don't feel they would be very helpful.

STUDENT 29

Anatomy: Labeling 12/26 (26/26), Specific Structures 1/2 (2/2)

Procedure: 2/3 (3/3)

Safety: 1.5/2 (2/2)

Short Answer Scores:

C (correct)   PC (partially correct)   I (incorrect)   NR (no response)
● (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (NR)(C) The fingerlike projections attached to the stomach are called the:

_____________________

● (C)(C) What purpose does the swim bladder serve?
● (C)(C) Why is it important to wear gloves that properly fit?
● (I)(C) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (C)(C) Why might it be helpful to remove your fish’s operculum before dissection?
● External Structures 7/13 (13/13)
● Internal Structures 5/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a frog years ago. I did not find anything especially difficult.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I believe they would have slightly benefited from having a guide of a real, hands-on dissection. Of course, this does not mean their dissection would be perfect.
● (PC)(C) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (C)(C) Why might it be helpful to remove your fish’s operculum before dissection?
● External Structures 10/13 (13/13)
● Internal Structures 8/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I did dissection in a high school anatomy class, working on cats, cow eyes, frogs, and crayfish

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think that they’re generally helpful, though I think that the line cut too short on the one diagram should be more visible/clearly labeled, because I did struggle to understand what was meant by that initially, maybe a dotted line showing where it should have been cut to?

STUDENT 31
Anatomy: Labeling 9/26 (20/26), Specific Structures 0/2 (1/2)
Procedure: 1/3 (1/3)
Safety: 1.5/2 (1/2)
Short Answer Scores:
C (correct)    PC (partially correct)    I (incorrect)    NR (no response)
● (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (I)(I) The fingerlike projections attached to the stomach are called the:
● (I)(C) What purpose does the swim bladder serve?
● (C)(PC) Why is it important to wear gloves that properly fit?
● (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
● External Structures 6/13 (11/13)
• Internal Structures 3/13 (9/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

In middle school I took a dissection course at my school. We dissected: a perch, a baby shark, a sheep eye, a starfish, a sheep's heart, an earthworm, and a frog. We had to locate all the organs in the organisms.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think that seeing the "botched" student dissection illustrations were very helpful because it showed exactly where to make the cuts and then showed where to not cut and gave a better option on where to better cut.

STUDENT 32
Anatomy: Labeling 22/26(26/26), Specific Structures 1/2 (1/2)
Procedure: 3/3 (2.5/3)
Safety: 1.5/2 (2/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
• (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(C) Why is it important to wear gloves that properly fit?
• (C!)(C) How might you confirm that you've identified the fish's esophagus?
• (C)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (C)(C) Why might it be helpful to remove your fish's operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the:

_____________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures 13/13 (13/13)
• Internal Structures 9/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?
I've dissected a sheep's brain and a fetal pig. I found the hardest part being the smell rather than the actual dissection.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade

Yes I do because the illustrations are still showing you what to expect if you mess up your dissection.

STUDENT 33
Anatomy: Labeling 14/26 (26/26) , Specific Structures 0/2 (2/2)
Procedure: 1.5/3 (2/3)
Safety: 1/2 (1.5/2)
Short Answer Scores:
C (correct)     PC (partially correct)   I (incorrect)   NR (no response)

- (PC) (PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I) (PC) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (PC)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

- (I) (C) What purpose does the swim bladder serve?
- External Structures 10/13 (13/13)
- Internal Structures 4/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

owl pellets
owls
(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection? yes, so you know what not to do.

STUDENT 34
Anatomy: Labeling 19/26 (17/26), Specific Structures 1/2 (2/2)
Procedure: (1/3)(2/3)
Safety: (1/2)(1.5/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (C)(I) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures 10/13 (10/13)
- Internal Structures 9/13 (7/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

Pig

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Yes because I was extremely confused on a few things
STUDENT 35
Anatomy: Labeling 10/26 (24/26), Specific Structures (0/2)(2/2)
Procedure: (1.5/3)(1.5/3)
Safety: (0.5/2)(1/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(PC) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (PC)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: ______________________
- (I)(C) What purpose does the swim bladder serve?

External Structures 8/13 (13/13)
Internal Structures 2/13 (11/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?
I have only dissected owl pellets.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?
I think it’s always good to include the incorrect way to do something because in a lot of instances, it's much like the correct way to do something and it can help with confusion.

STUDENT 36
Anatomy: Labeling, Specific Structures 1/2 (2/2)
Procedure: 3/3 (2.5/3)
Safety: 1/2 (2/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I(incorrect)  NR (no response)

- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C)(C) Why is it important to wear gloves that properly fit?
- (C)(C!) How might you confirm that you've identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: _______________________
- (C)(C) What purpose does the swim bladder serve?

**External Structures**

**Internal Structures**

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

I've dissected leopard frogs, worms, and a yellow perch. not that I remember

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think it was helpful to see what not to do but a real hands on dissection may have been better.

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STUDENT 37
Anatomy: Labeling 5/26 (26/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (2/3)
Safety: 1/2 (1.5/2)
Short Answer Scores:

C (correct)  PC (partially correct)  I(incorrect)  NR (no response)

- (I)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (I)(C) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(C) The fingerlike projections attached to the stomach are called the: _______________________
• (C)(C) What purpose does the swim bladder serve?

External Structures 3/13 (13/13)
Internal Structures 2/13 (13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I’ve dissected cow eyes, sheep brain, and a heart. I found the brain to be difficult because it has labeled sections.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think they were good and that they would be helpful as a guide for a real, hands-on dissection.

STUDENT 38
Anatomy: Labeling 6/26 (18/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (0.5/3)
Safety: 1.5/2 (1/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
• (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(I) Why is it important to wear gloves that properly fit?
• (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
• (NR) (I) The fingerlike projections attached to the stomach are called the: _______________________
• (C) (C) What purpose does the swim bladder serve?
• External Structures 6/13 (11/13)
• Internal Structures 0/13 (7/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have no prior experience.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Yes, I think that this would help students. For me reading something and or visualizing this before doing the hands on assignment at least for me is very beneficial.

STUDENT 39
Anatomy: Labeling 16/26 (12/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (0.5/3)
Safety: 2/2 (1/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
• (C)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (C)(PC) Why is it important to wear gloves that properly fit?
• (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the:
  _____________________
• (C)(C) What purpose does the swim bladder serve?
• External Structures 6/13 (9/13)
• Internal Structures 10/13 (3/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?
I’ve never done a fish dissection, but my family and I salmon fish and I’ve watched the fish get gutted before. The intestine question was rather difficult. I’ve dissected a worm before, and a cat.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?
Waiting for grade

I do not think they would be helpful in a real dissection. I think that if they were a post-dissection it may help students memorize what is where.

STUDENT 40

Anatomy: Labeling 15/26 (18/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (2.5/3)
Safety: 2/2 (2/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C)(C) Why is it important to wear gloves that properly fit?
- (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________
- (C)(C) What purpose does the swim bladder serve?
- External Structures 4/13 (13/13)
- Internal Structures 11/13 (5/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a frog, cow eye, sheep eye, cow heart, and cow brain. The heart was a little difficult to differentiate structures inside as the heart our group had was very mangled when it was given to us.
(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?
Waiting for grade

I do think it would have been helpful for the student to have a guide. It's hard to know what exactly you're trying to accomplish not having a guide when dissecting.

STUDENT 41
Anatomy: Labeling, Specific Structures 1/2 (2/2)
Procedure: 3/3 (2.5/3)
Safety: 1.5/2 (1.5/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (C)(C) Why is it important to wear gloves that properly fit?
- (C)(C) How might you confirm that you've identified the fish's esophagus?
- (C)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

(External Structures)
(Internal Structures)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

I did a dissection on a lamb heart in 7th grade but I am in Marine Biology and have been a fisherman for a long time.

Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?
Waiting for grade
It's a waste of a specimen the fish died to be torn apart. Following a guide would produce better results and be more respectful to the dead fish.

STUDENT 42
Anatomy: Labeling (N/A), Specific Structures 0/2 (2/2)
Procedure: 1/3 (1.5/3)
Safety: 0.5/2 (1.5/2)
Short Answer Scores:

C (correct) PC (partially correct) I (incorrect) NR (no response)

- (I) (C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC) (PC) Why is it important to wear gloves that properly fit?
- (I) (PC) How might you confirm that you've identified the fish's esophagus?
- (C) (C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I) (I) Why might it be helpful to remove your fish's operculum before dissection?
- (I) (C) The fingerlike projections attached to the stomach are called the:

- (I) (C) What purpose does the swim bladder serve?

- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a kidney and sheep brain before in Anatomy & Physiology in highschool. I thought it was very interesting for the most part, but at times I thought it was extremely gross.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

I think the diagrams given were still helpful, but dissections do get messy.

STUDENT 43
Anatomy: Labeling 10/26 (23/26), Specific Structures 1/2 (2/2)
Procedure: 3/3 (3/3)
Safety: 1.5/2 (2/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(C) Why is it important to wear gloves that properly fit?
- (PC)(C!) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (PC)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the: _______________________
- (C)(C) What purpose does the swim bladder serve?
- External Structures 9/13 13/13
- Internal Structures 1/13 10/13

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

I have dissected a cat, pig heart, crawdad, tape worm, flat worm, and a round worm.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?
I liked them and yes.

STUDENT 44
Anatomy: Labeling 13/26 (23/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (1.5/3)
Safety: 1/2 (2/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
● (I)(C) The fingerlike projections attached to the stomach are called the: __________________________
● (C)(C) What purpose does the swim bladder serve?
● External Structures (7/13)(12/13)
● Internal Structures (6/13)(11/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I’ve dissected squids, rats, lamb eyes, pig heart, and a cat. I had a human physiology class in highschool. Not particularly. Maybe the language.

(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

Waiting for grade

it was an interesting addition that i thought quite cool. if the intent of the dissection is to evaluate the ability of the disector, such as preparation for many more dissections then it may be useful to see what a failure looks like, but for the purpose of learning it doesn’t seem needed to me and may actually make students overly cautious or anxious of messing up. Especially for those who are not experienced in dissection, making the quality of the dissection worse, the dissection taking way longer than its supposed to, and may even result in an injury from overfocusing on the fish.

Figure B6: Video Procedure Results

STUDENT 46
Anatomy: Labeling 4/26 (26/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (0.5/3)
Safety: 2/2 (1.5/2)

Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
● (C)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (C)(C) Why is it important to wear gloves that properly fit?
● (I) (I) How might you confirm that you’ve identified the fish’s esophagus?
When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)

Why might it be helpful to remove your fish’s operculum before dissection?

The fingerlike projections attached to the stomach are called the:

What purpose does the swim bladder serve?

External Structures (3/13) (13/13)
Internal Structures (1/13) (13/13)

What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have never dissected a fish or any organism or had any prior knowledge with fish.

What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

STUDENT 47
Anatomy: Labeling 10/26 (25/26), Specific Structures 1/2 (2/2)
Procedure: 2/3 (1.5/3)
Safety: 1/2 (2/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)

Why is it important to wear gloves that properly fit?

How might you confirm that you’ve identified the fish’s esophagus?

When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)

Why might it be helpful to remove your fish’s operculum before dissection?

The fingerlike projections attached to the stomach are called the:

What purpose does the swim bladder serve?
- External Structures (6/13)(12/13)
- Internal Structures (4/13)(13/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

No experience

(NR)(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

STUDENT 48

Anatomy: Labeling 7/26 (11/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (1.5/3)
Safety: 1/2 (1.5/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC) Why is it important to wear gloves that properly fit?
- (I)(PC) How might you confirm that you've identified the fish's esophagus?
- (C)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?

External Structures 5/13 (6/13)
Internal Structures 2/13 (5/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you had found especially difficult?

In high school I dissected a worm, squid, rat, and starfish in my honors biology class. Sometimes it was hard with tight time constraints.
(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

It seemed helpful and covered most of the things I'd expect.

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STUDENT 49

Anatomy: Labeling 11/26 (19/26), Specific Structures 1/2 (2/2)
Procedure: 1.5/3 (2/3)
Safety: 0.5/2 (2/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- (PC) (C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I) (C) The fingerlike projections attached to the stomach are called the:
- (C) (C) What purpose does the swim bladder serve?
- (I) (PC) Why is it important to wear gloves that properly fit?
- (PC) (PC) How might you confirm that you've identified the fish's esophagus?
- (C) (C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I) (I) Why might it be helpful to remove your fish's operculum before dissection?
- External Structures 8/13 (10/13)
- Internal Structures 3/13 (9/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I've had experience in dissecting sheep hearts and a fetal pig. I found that making the proper incisions without cutting something important was difficult, as well as identifying everything.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?
I liked the student experiment more. It would be easier to see what the experiment is more likely to look like.

STUDENT 50

Anatomy: Labeling 8/26 (16/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (2.5/3)
Safety: 1/2 (2/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) The fingerlike projections attached to the stomach are called the:
- (C)(C) What purpose does the swim bladder serve?
- (PC)(I) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(PC) Why might it be helpful to remove your fish’s operculum before dissection?

External Structures 6/13 10/13
Internal Structures 2/13 6/13

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected a cow eye in sixth grade

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think it would have been more helpful to see it done by a professional because it was hard to tell the difference between the internal organs.

STUDENT 51
Anatomy: Labeling 3/26 (12/26), Specific Structures 1/2 (2/2)
Procedure: 0.5/3 (2.5/3)
Safety: 1.5/2

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(I) Why is it important to wear gloves that properly fit?
• (I)(C) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(C) The fingerlike projections attached to the stomach are called the:

___________________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures 2/13 (12/13)
• Internal Structures 1/13 (0/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I dissected a frog and a worm before. The only thing I found hard was making sure you don’t puncture anything when your dissecting

(NR)(Optional) What was your opinion on seeing the "botched" student dissection illustrations? Do you think they would have been helpful if they had been a guide for a real, hands-on dissection?

STUDENT 52

Anatomy: Labeling 13/26 (26/26), Specific Structures 0/2 (2/2)
Procedure: 1.5/3 (1/3)
Safety: 1/2 (2/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(C) Why is it important to wear gloves that properly fit?
● (PC)(PC) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
● (I)(C) The fingerlike projections attached to the stomach are called the: ___________________
● (I)(C) What purpose does the swim bladder serve?

External Structures 9/13 (13/13)  
Internal Structures 7/13 (13/13)

(Optional) (NR) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I feel as though this would have been slightly more helpful because the person speaking said something along the lines of "this is what a typical student dissection looks like" which I feel is much more relatable for students that trying to make it perfect as if watching a professional dissection.

STUDENT 53

Anatomy: Labeling 9/26 (13/26), Specific Structures 1/2 (1/2)  
Procedure: 1/3 (2/3)  
Safety: 1.5/2 (1/2)  
Short Answer Scores:  
C (correct)  PC (partially correct)  I(incorrect)  NR (no response)
● (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (C)(I) Why is it important to wear gloves that properly fit?
● (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the:_____________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures 6/13 (8/13)
• Internal Structures 3/13 (5/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I had dissected a piglet my junior year of high school in my honors biology class. The most difficult thing for me was the smell, because the piglets had been soaked in formaldehyde, and keeping a steady hand (I did in fact accidentally cut open its small intestine).

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think the video guide using "botched" fish dissected by amateurs showed the reality of dissection especially if it was your first time. I don't believe watching a professional dissect the perch would be any more helpful, it might make students believe that this is easy, when in fact it is tedious.

STUDENT 54

Anatomy: Labeling 11/26 (20/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (2.5/3)
Safety: 1/2 (2/2)
Short Answer Scores:
C (correct) PC (partially correct) I(incorrect) NR (no response)
• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(C) Why is it important to wear gloves that properly fit?
• (I)(PC) How might you confirm that you've identified the fish's esophagus?
• (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
• (I)(C) The fingerlike projections attached to the stomach are called the:_____________________
What purpose does the swim bladder serve?

External Structures 7/13 (12/13)
Internal Structures 4/13 (8/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have never dissected anything before, I took anatomy in high school but it was during Covid so it was online and I didn't do anything in person. Others in my school have done a lambs heart and frogs.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think that it was really well done describing the outside of the fish but the inside got confusing because the fish was being rotated the whole time so it was hard to take notes and follow along, I didn't notice the "botched" fish dissection because I've never seen one done before.

STUDENT 55

Anatomy: Labeling 21/26 (24/26), Specific Structures 1/2 (1/2)
Procedure: 1/3 (2/3)
Safety: 1/2 (1.5/2)

Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(PC) Why is it important to wear gloves that properly fit?
• (I)(I) How might you confirm that you've identified the fish's esophagus?
• (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the:

• (C)(C) What purpose does the swim bladder serve?
• External Structures 11/13 (13/13)
• Internal Structures 10/13 (11/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a fish and a worm before but it was a long time ago.

(Optional) (NR) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

STUDENT 56

Anatomy: Labeling 6/26 (20/26), Specific Structures 0/2 (0.5/2)
Procedure: 1/3 (0/3)
Safety: 1/2 (1/2)
Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

• (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (NR)(I) Why is it important to wear gloves that properly fit?
• (NR)(I) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (NR)(NR) Why might it be helpful to remove your fish’s operculum before dissection?
• (NR)(I) The fingerlike projections attached to the stomach are called the:

• (NR)(PC) What purpose does the swim bladder serve?
• External Structures 4/13 (10/13)
• Internal Structures 2/13 (10/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

The last time I did a dissection was my junior year of high school which was 3 years ago. We used a sheep heart, a cat, and a frog. I used don’t know a fish’s anatomy.
(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I'm not sure I feel like it could have been a bit more helpful.

STUDENT 57

Anatomy: Labeling 8/26 (14/26), Specific Structures 0/2 (1/2)
Procedure: 1.5/3 (1/3)
Safety: 0.5/2 (2/2)
Short Answer Scores:
C (correct)   PC (partially correct)   I (incorrect)   NR (no response)

• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(C) Why is it important to wear gloves that properly fit?
• (PC)(I) How might you confirm that you've identified the fish's esophagus?
• (C)(I) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
• (I)(C) Why might it be helpful to remove your fish's operculum before dissection?
• (I)(I) The fingerlike projections attached to the stomach are called the:

• (I)(C) What purpose does the swim bladder serve?

External Structures 6/13 (9/13)
Internal Structures 2/13 (5/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Sheep brain in 7th grade. None that I can remember

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I would've liked to see a side-by-side comparison of a professional dissection and a student dissection.
STUDENT 58

Anatomy: Labeling 13/26 (15/26), Specific Structures 1/2 (2/2)
Procedure: 1/3 (0/3)
Safety: 1/2 (1/2)

Short Answer Scores:
C (correct)   PC (partially correct)   I (incorrect)   NR (no response)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(I) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you've identified the fish's esophagus?
- (C)(I) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (I)(I) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?

External Structures 11/13 (10/13)
Internal Structures 2/13 (5/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected pig kidneys and a sheep brain. I found both of these dissections very cool but the organs were very delicate, so that was difficult when cutting.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

professional because they know what they are doing and cut correctly.

STUDENT 59

Anatomy: Labeling 8/26 (13/26), Specific Structures 0/2 (0/2)
Procedure: 1/3 (0/3)
EXPLORING PEDAGOGICAL APPROACHES

Safety: 1/2 (1.5/2)

Short Answer Scores:

C (correct) PC (partially correct) I (incorrect) NR (no response)

• (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(C) Why is it important to wear gloves that properly fit?
• (NR)(NR) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
• (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(NR) The fingerlike projections attached to the stomach are called the:

_____________________

• (I)(I) What purpose does the swim bladder serve?
• External Structures 6/13 (9/13)
• Internal Structures 2/13 (7/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I last dissected something in 6th grade and by that point I dissected a sheep eye and some part of a cow, I forgot which part.

(NR) (Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

STUDENT 60

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 1.5/3 (1.5/3)
Safety: 1/2 (1/2)

Short Answer Scores:

C (correct) PC (partially correct) I (incorrect) NR (no response)

• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (PC)(I) Why is it important to wear gloves that properly fit?
• (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
• (C)(PC) When making your first incision, should you cut along the fish’s belly or side first?  
  (Or, does it not matter?)
• (PC)(C) Why might it be helpful to remove your fish’s operculum before dissection?
• (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

• (C)(C) What purpose does the swim bladder serve?
• External Structures
• Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

When I was in 8th grade we dissected frogs. Then my freshman year in highschool for biology we dissected worms, crickets, frogs, and baby nurse sharks. Dissecting the worm was the hardest because it was so small and we had to be so precise.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think it was helpful to learn by amateurs first then by a professional.  

STUDENT 61

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 0/3 (0.5/3)
Safety: 0.5/2 (2/2)
Short Answer Scores:

C (correct) PC (partially correct) I (incorrect) NR (no response)
• (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
• (I)(C) Why is it important to wear gloves that properly fit?
• (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
• (I)(PC) When making your first incision, should you cut along the fish’s belly or side first?  
  (Or, does it not matter?)
• (I)(I) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:
  ________________
- (C)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected a cow eye, it was not super difficult.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I liked the video because it was a student doing it, so it made a little more sense since it wasn't perfect.

STUDENT 62

Anatomy: Labeling (N/A), Specific Structures 0/2 (2/2)
Procedure: 1/3 (2.5)
Safety: 0.5/2 (2/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(PC) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:
  ________________
- (I)(C) What purpose does the swim bladder serve?
● External Structures
● Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have dissected an eye of a cow to learn more about the eye anatomy. The hardest part was maintaining its shape and cutting through the layers.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think it was a great video and very informative on what to do and not to do with the representation of a student that did it wrong. It would also be beneficial with another video included by a professional for visual comparison.

STUDENT 63

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 1.5/3 (0.5/3)
Safety: 1/2 (1.5/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

● (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
● (PC)(C) Why is it important to wear gloves that properly fit?
● (PC)(I) How might you confirm that you’ve identified the fish’s esophagus?
● (C)(I) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
● (I)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
● (I)(C) The fingerlike projections attached to the stomach are called the:

● (C)(C) What purpose does the swim bladder serve?
● External Structures
● Internal Structures
(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have never dissected any organisms before.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

My opinion is that it gave me insight to what a beginner dissect would look like. It would have been more helpful to watch a professional dissect the perch if it was a real dissection lab.

STUDENT 64

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 2/3 (3/3)
Safety: 1.5/2 (2/2)

Short Answer Scores:
C (correct)   PC (partially correct)   I (incorrect)   NR (no response)

- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(C!) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

_____________________

- (C)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Previsouly, I have dissected a young small species of squid, a rat, and a sea urchin. None of the dissection were especially difficult, although some took longer and some were more gross to dissect.
The small species of squid was somewhat hard to identify some of the parts of the body, because some parts were small or slightly out of place from the reference picture.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think the video was better using the "botched" fish, because it is more realistic to the students that are going to dissect the organism, in this case the perch. They are not professionals, so the video helps put it into perspective that amateurs are bound to make minor mistakes when dissecting. It helps emphasize to the amateurs that you need to try your best to mitigate these errors, and you need to try to adjust and be able to analyze the parts of the organism even if you have a less than optimal dissection of the organism, in this case the perch.

STUDENT 65
Anatomy: Labeling (N/A), Specific Structures 0/2 (1/2)
Procedure: 0/3 (1/3)
Safety: 1.5/2 (0.5/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- (C)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(I) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you've identified the fish's esophagus?
- (I)(PC) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (NR)(PC) Why might it be helpful to remove your fish's operculum before dissection?
- (NR)(I) The fingerlike projections attached to the stomach are called the: ______________________
- (NR)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?
I have done a sheep brain, cat, frog, baby fish and a cow heart

my cat was very chunky was very hard to see inside

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

In my opinion I would like to see a professional just because they know more about what they are doing.

STUDENT 66

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 2.5/3 (2/3)
Safety: 1/2 (1/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)

- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(PC) Why is it important to wear gloves that properly fit?
- (PC)(I) How might you confirm that you've identified the fish's esophagus?
- (C)(C) When making your first incision, should you cut along the fish's belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish's operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:
  ____________________
- (C)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I have directed a cows heart, a starfish, and a worm in highschool. I actually enjoyed dissecting animals and it was pretty easy for me.
(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

It would have been more helpful to watch a professional do it because they could add useful tips and more information on the fish in the video.

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STUDENT 67

Anatomy: Labeling (N/A), Specific Structures 1/2(2/2)
Procedure: 2.5/3 (2/3)
Safety: 1/2(1/2)

Short Answer Scores:
C (correct) PC (partially correct) I (incorrect) NR (no response)
- (PC)(PC) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(PC) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

- a cow eye
- Sheep brain

I found the eye to be much more difficult than the brain to dissect.
(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I think it would have been more helpful to watch a professional dissect the perch.

STUDENT 68

Anatomy: Labeling (N/A), Specific Structures 1/2 (2/2)
Procedure: 2/3 (3/3)
Safety: 0.5/2 (2/2)

Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)

- (PC) (C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I) (C) Why is it important to wear gloves that properly fit?
- (I) (PC) How might you confirm that you’ve identified the fish’s esophagus?
- (C) (C) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (C) (C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I) (C) The fingerlike projections attached to the stomach are called the:
  __________
- (C) (C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I HAD TO ANSWER RANDOMLY FOR THE TWO QUESTIONS ABOVE, THE PICTURE WOULD NOT APPEAR

I have dissected a small shark and a frog. I found identifying the frog body parts was difficult due to the size.
Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

PHOTOS ABOVE STILL DID NOT SHOW UP.

I think it was good that a student dissection was used because it shows that you can still get a very large amount of information from a dissection even though the dissection wasn't perfect.

STUDENT 69

Anatomy: Labeling (N/A), Specific Structures 1/2 (1/2)
Procedure: 2.5/3 (1.5/3)
Safety: 1/2 (2/2)

Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)

- (C)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (I)(C) Why is it important to wear gloves that properly fit?
- (I)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (PC)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (C)(C) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(I) The fingerlike projections attached to the stomach are called the:

- (C)(C) What purpose does the swim bladder serve?
- External Structures
- Internal Structures

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

I haven’t dissected much, but I have dissected a pig heart. Some parts of the heart were hard to cut into.
(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?

I feel like it would have been more helpful if it was dissected by a professional, and that is how it is taught to the students who were doing it. If the example is messy, the results of the other students would be messier since they learned from a "messy" model.

---

STUDENT 70

Anatomy: Labeling (17/23)(15/23), Specific Structures 1/2 (2/2)
Procedure: 2.5/3 (1/3)
Safety: 1/2 (1/2)
Short Answer Scores:
C (correct)  PC (partially correct)  I (incorrect)  NR (no response)
- (PC)(C) Why might it be important to wear goggles during dissection? (Apart from standard lab protocol)
- (PC)(I) Why is it important to wear gloves that properly fit?
- (PC)(I) How might you confirm that you’ve identified the fish’s esophagus?
- (C)(PC) When making your first incision, should you cut along the fish’s belly or side first? (Or, does it not matter?)
- (I)(PC) Why might it be helpful to remove your fish’s operculum before dissection?
- (I)(C) The fingerlike projections attached to the stomach are called the:
- (C)(C) What purpose does the swim bladder serve?

External Structures (12/13)(11/13)
Internal Structures (5/13)(4/13)

(Optional) What prior dissection experience have you had? What creatures did you use? Was there anything you found especially difficult?

Frogs and rat dissection in HS, cutting them open was difficult.

(Optional) What was your opinion of the video guide using "botched" fish dissected by amateurs? Would it have been more or less helpful to watch a professional dissect the perch, if this were a real dissection lab?
It was a little confusing, a professional video would have been more helpful.
### Appendix C
Statistical Data

Table C1: Summary of T-Values of Different Scoring Sections When Comparing Written and Video Groups

<table>
<thead>
<tr>
<th>Scoring Section</th>
<th>Anatomy Diagram</th>
<th>Specific Anatomy</th>
<th>Procedure</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute T-Value</td>
<td>2.81</td>
<td>0.34</td>
<td>0.44</td>
<td>0.18</td>
</tr>
<tr>
<td>Critical T-Value</td>
<td>1.67</td>
<td>1.69</td>
<td>1.69</td>
<td>1.69</td>
</tr>
<tr>
<td>Result</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>

Table C2: Summary of T-Values for Pretest-Posttest Data of Written Group

<table>
<thead>
<tr>
<th>Scoring Section</th>
<th>Anatomy Diagram</th>
<th>Specific Anatomy</th>
<th>Procedure</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute T-Value</td>
<td>16.00</td>
<td>8.08</td>
<td>1.53</td>
<td>4.58</td>
</tr>
<tr>
<td>Critical T-Value</td>
<td>1.66</td>
<td>1.69</td>
<td>1.69</td>
<td>1.69</td>
</tr>
<tr>
<td>Result</td>
<td>Significant</td>
<td>Significant</td>
<td>Not Significant</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Table C3: Summary of T-Values for Pretest-Posttest Data of Video Group

<table>
<thead>
<tr>
<th>Scoring Section</th>
<th>Anatomy Diagram</th>
<th>Specific Anatomy</th>
<th>Procedure</th>
<th>Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute T-Value</td>
<td>4.00</td>
<td>5.38</td>
<td>6.29</td>
<td>4.00</td>
</tr>
<tr>
<td>Critical T-Value</td>
<td>1.70</td>
<td>1.71</td>
<td>1.71</td>
<td>1.71</td>
</tr>
<tr>
<td>Result</td>
<td>Significant</td>
<td>Significant</td>
<td>Significant</td>
<td>Significant</td>
</tr>
</tbody>
</table>
Appendix D

Instructional Material Provided to the Written Guide Group

YELLOW PERCH DISSECTION: SAFETY, PROCEDURE, ANATOMY

SAFETY

I. Even putting aside the biohazardous nature of a dead animal, these fish are preserved in (insert preservatives here). These chemicals should not be ingested, inhaled, or in contact with your skin and eyes. Vapors and even spray from this preservative will absolutely irritate your eyes if you do not use splashproof goggles, not safety glasses or goggles with vents.

II. This lab will use dissecting scissors designed to cut through muscle and bone. Should you cut yourself, immediately leave your station, wash the cut with soap and water, and use the antiseptic and bandages in your lab's first aid kit. You should also notify your professor, TA, or lab supervisor.

III. As with any lab, you should not chew gum or bring in food or drinks.

IV. Put on your safety goggles and rubber gloves (be certain the gloves are in your size). Gloves that are too small may tear, and gloves that are too large will obstruct your view and may slide down your hand.

V. Long hair should be pulled back, and you should be wearing clothing that will not dangle or get in your way.

TOOLS

I. For a basic fish dissection, you will need the following tools:
   A. Forceps
   B. Dissecting scissors
   C. Probe
   D. Angled Probe

These tools should not be rusty, have loose attachments, or be difficult to operate. Beyond tools, you should also have a dissection tray with a rubber mat for easy cleanup.

EXTERNAL EXAMINATION

A. Pick up and inspect the fish's external anatomy. Familiarize yourself with the diagram on the next page:
You should be able to identify each of these structures and their purpose, as written below:

<table>
<thead>
<tr>
<th>Structure</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes</td>
<td>Taking in visual information</td>
</tr>
<tr>
<td>Nares (nostrils)</td>
<td>Taking in olfactory information. Note: not involved in respiration</td>
</tr>
<tr>
<td>Lateral Line</td>
<td>Detecting vibrations and water movement, which helps orient themselves in the water.</td>
</tr>
<tr>
<td>Anus</td>
<td>Expulsion of waste</td>
</tr>
<tr>
<td>Mouth</td>
<td>Respiration and eating</td>
</tr>
</tbody>
</table>

As you inspect the fish’s mouth, run your probe along the top and bottom jaws. You should notice a rough texture—yellow perch have very small and fine teeth.

Gills  Structures composed of fine filaments that take in water, filter out its oxygen for respiration, then expel the water.
In order to see the gills, you need to pull back the **operculum**, a bony plate that protects the gills. During your inspection, you should notice a rounded, bony structure attached to the gills’ origin. This is a **gill arch**, meant to support the gill filaments. You should also see teeth-like projections along the arches. These are **gill rakers**, which help to prevent large particles from passing through the gills.

Use your probe to follow the path water takes through the perch.

Insert the straight probe into the fish’s mouth, angling it so it will pass the gill arch and become visible from the other side. You should not need to force it through. You will likely feel a scraping sensation as the probe reaches the gill rakers. If you do not see your probe, it is in the fish’s esophagus.

| **Dorsal Fins:** | Stabilizes the fish while swimming and directs the fish through turns and stops |
| **Caudal Fin:** | Moves from side-to-side to propel the fish forward |
| **Anal Fin:** | Stabilizes the fish while swimming |
| **Pelvic Fins:** | Work in tandem to allow the fish to swim up or down |
| **Pectoral Fin:** | Controls directional movement |
DISSECTION

There are many ways to dissect a fish, and no one method is correct. However, this is the method taught by Dr. Miner of BGSU’s Biology department.

Begin by hooking the lower end of your scissors into the fish’s anus, tilting upward. Continue cutting until the end of the dotted line, as shown on this image. It is important to cut with the scissors tilted upwards, to avoid nicking the organs as much as possible.

Midway through cutting, you’ll feel something hard. This is the pelvic girdle, a bony structure that supports the pelvic fins.

You may need to change your grip on the scissors or use two hands. Much of your dissection time will likely be dedicated to cutting through this bone while remaining careful. You may want to allow some liquid preservative to escape from this cut before continuing.

Next, make a second incision that also starts at the anus, cutting along the line shown in this image. You may find it easier to remove the pectoral fin and operculum first.

Notice that in this image on the left, the student’s first incision ended too early. They will have to make additional cuts in order to meet at the right point.

Also, in both of these drawings, the student’s gloves are much too large. It will be difficult to keep the loose extra material out of the way while cutting and probing, and harder to see what they are doing.

Pull the section of the body wall free to expose the fish’s body cavity. This may require additional cuts to separate the tissue.
The above diagram shows how your fish may look. Note that parts of the body wall seem to be torn due to a messy removal, and the swim bladder is in tatters. The incision could also end much higher—it will be more difficult for the student to see the fish’s gills and esophagus—and how they connect.

Every perch has a gonad, but if your fish is a mature female, its ovary may obscure much of the organs. Carefully remove the gonad with your forceps—chunks of eggs will break free very easily and clutter your fish’s organs.

Here is a closer look at the same fish, with the ovary removed. The green gallbladder especially stands out—part of the gonad you remove may have a green tint from its bile. Carefully move the lobes of the liver aside to see how the esophagus connects to the stomach, which then connects to the intestines, and then the anus.
This diagram showcases the relative position of each of the fish's organs. Please note that the colors are not accurate, and that torn tissue can make identification more confusing. Use your forceps and probes to search for and identify each organ. Review the purpose of each organ you identify below:

<table>
<thead>
<tr>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Wall</td>
<td>A general term referring to the skin, muscle, and bone surrounding the fish's internal cavity. Inexperienced dissectors are unlikely to cut cleanly through this, and may need to cut multiple times to remove all layers and create an acceptably-sized window.</td>
</tr>
<tr>
<td>Gonad</td>
<td>A fish's sex organ, containing either sperm or eggs for external fertilization.</td>
</tr>
<tr>
<td>Swim Bladder</td>
<td>A balloon-like organ that can inflate and deflate, allowing the fish to control its buoyancy in the water.</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>Stores bile until needed to aid digestion in the intestine</td>
</tr>
<tr>
<td>Kidney</td>
<td>Filters waste and regulates salt concentration. Unlike a human's, a fish's kidney is long and thin, following the path of the spine.</td>
</tr>
<tr>
<td>Heart</td>
<td>Pushes oxygenated blood through the circulatory system. Unlike other animals, fish only have two-chambered hearts, as deoxygenated blood travels to the gills instead of returning to the heart.</td>
</tr>
<tr>
<td>Organ</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Liver</td>
<td>Breaks down stored fat and filters out toxins.</td>
</tr>
<tr>
<td>Spleen</td>
<td>A reservoir for red blood cells and a lymphoid organ, which produce lymphocytes as part of the fish’s immune system. Its color may still be hard to find as it is small and tucked behind the digestive organs.</td>
</tr>
<tr>
<td>Esophagus</td>
<td>Passes food from the mouth to the stomach. It can be difficult to differentiate from muscle ligaments or veins. If unsure, a dissector can gently push their probe into the fish’s mouth until they can see movement in the esophagus.</td>
</tr>
<tr>
<td>Stomach</td>
<td>The organ where most digestion occurs, linking the esophagus and intestine. Dissectors may notice that it is not as soft and flexible as other organs.</td>
</tr>
<tr>
<td>Pyloric Caeca</td>
<td>The function of these fingerlike projections is not fully confirmed—however, they likely aid in producing digestive enzymes, similar to a pancreas.</td>
</tr>
<tr>
<td>Intestine</td>
<td>A long organ that carries out the rest of the digestive process, which absorbs the remaining nutrients before the waste is expelled. The coils of this organ are connected by a thin membrane that may need to be moved or cut to better see other organs.</td>
</tr>
</tbody>
</table>

It may be helpful to cut free or pull out certain organs to more easily find others. Once you believe you have found and correctly identified each structure, flag down your professor, TA, or lab supervisor to confirm you have done so correctly.

**POST-PROCEDURE:**
After completing your dissection, dispose of your specimen as directed by your professor, TA, or lab instructor. Clean your tools and dissection tray mat with soap and water, and pat the mat dry with a paper towel. You may also need to clean the surface of your lab table. Lastly, remove your gloves and wash your hands thoroughly.
Appendix E

Video Link and Transcript

“Student’s Guide to Dissection” [https://www.youtube.com/watch?v=lhjQ-KLDKV4](https://www.youtube.com/watch?v=lhjQ-KLDKV4)

Transcript:

Thank you for agreeing to participate in this research study. If you are watching this, you will have already answered the preliminary questions. While you watch this video, feel free to take notes, pause, and rewind as needed.

Today I’ll be showing you the safety guidelines, procedure, and anatomy surrounding a yellow perch dissection. As in all things, safety comes first. Our specimen is preserved in Propylene Glycol 2-Phenoxyethanol and 2-Amino-2-Ethyl-1,3-Propanediol, which can be hazardous if ingested, inhaled, or in contact with your skin and eyes. That’s why it’s important to wear properly-fitting gloves and splashproof goggles, not safety glasses or goggles with vents.

This lab will use the following tools:
Forceps, dissecting scissors, a straight probe, and an angled probe. The dissecting scissors are designed to cut through muscle and bone, so caution should be exercised. Should you cut yourself, immediately leave your station, wash the cut with soap and water, and use the antiseptic and bandages in your lab’s first aid kit. You should also notify your professor, TA, or lab supervisor.

With that in mind, let’s begin the lab by observing this fish’s external anatomy.

We have the eyes, which take in visual information, the nares here, that take in olfactory information, and the mouth, which is used for respiration and eating. It’s important to note that fish don’t breathe through their noses at all, as we would. If you run your probe along the top and bottom jaws, you’ll notice a rough texture—perches have very small and fine teeth. On the opposite side of the digestive system, we have the anus, which expels waste.

Here we have the operculum, a bony covering that protects the gills. When we pull it back, we can see the gill filaments, and the gill rakers farther back. The filaments are the structures that pull oxygen from the water for respiration, while the rakers prevent larger particles, like food, from passing through the gills.
Here, we're going to use our straight probe to follow the path that water takes through a perch. Enter the fish's mouth at a slight angle, allowing it to pass through a gill arch. You should not need to force it through. If you cannot see the tip of your probe on the other side, it's probably in the esophagus.

Looking closely, we can trace the lateral line of the perch. This sense organ can detect movement and vibrations in the water, which helps them orient themselves.

Next, we'll look at the fins. As ray-finned fish, perch have thin fins consisting of bony spines and flexible webbing.

These are the dorsal fins, which stabilize the fish and directs them through turns and stops

This is the caudal fin, which moves from side-to-side to propel the fish forward

This is the anal in, which helps stabilize the fish while swimming

These are the pelvic fins, which are used for up-and-down movement,

And these are the pectoral fins, which control left-and-right movement.

Now that we've identified the external structures, we can make our first incision. There are actually several ways to do this, but this method is what is taught by our Dr. Miner at BGSU. First, hook the lower end of your dissecting scissors into the anus and cut a straight line up to the jaw. Make sure to keep your blade angled upwards, to avoid nicking any organs.

Midway through cutting, you'll meet resistance. This is the pelvic girdle, a bony structure supporting the pelvic fins. You may need to change your grip to help apply more force. As you can see, this dissector is struggling. The process of cutting through this structure without causing extra damage is the most time-consuming part of this dissection.

Once the first incision is complete, return to the anus and begin cutting upward in an arc, stopping again at the jaw. You may find it easier to cut off the pectoral fin and operculum first. You will also need to make additional cuts as you try to pull the body wall away.

Your fish is now open, but it may not be pretty. As student dissectors, our cuts tend to be less clean, with ragged tissue and nicked organs. Here, the student slit open the intestine, causing waste matter to be exposed. Over here, the student sliced open the heart. Here, there is so much damaged tissue that it's difficult to distinguish from the internal structures. This is what a typical student dissection looks like, so it's important to be able to glean information from such a messy sample.
Let’s start by removing the gonad with the forceps. Avoid damaging it, as loose chunks of sperm or eggs will escape and clutter the body cavity. In a living fish, these are released into the water by the thousands to fertilize or be fertilized. As you can see, the anterior end has a green tinge—this is because it was in contact with the gallbladder. Now we have a better view of the internal organs.

Up here is the swim bladder, a delicate balloon-like organ that can inflate and deflate to control a fish’s buoyancy. It is difficult to open your fish without shredding this delicate membrane, leaving an empty pocket behind.

Along the spine, we can see the kidney, which filters waste and regulates salt concentration in the body.

This little green organ is the gallbladder, which stores bile until it's needed to aid in digestion.

Over here is the liver, which breaks down stored fat and filters out toxins. It’s quite large and often needs to be pushed aside to see other organs.

Here is a closer look at the gills. You can see the thin grey filaments and the gill arches they are attached to, as well as the little teethlike rakers on the inner arch.

Here, we can see the heart, which pushes blood through the circulatory system. If you look closely, you can see the arteries connected to the gills. Fish’s hearts only have two chambers, as they only need to process deoxygenated blood, while the gills handle the oxygenation process.

With a little effort, we can find the spleen, which stores red blood cells and contributes to the perch’s immune system.

Following the path from the jaw down, we can find the esophagus, and with a little effort see how it connects to the stomach.

This comma-shaped organ is the stomach, where the most digestion occurs. Take note of how it connects to the intestine, and the little fingerlike projections attached. These are the pyloric caeca, which are theorized to produce more digestive enzymes.
Arguably the easiest organ to identify is the intestine, which carries out the rest of the digestive process, absorbing any remaining nutrients and connects to the anus to expel waste. As you can see, the coils are held together by a thin membrane.

Before we conclude, here’s a look at why wearing properly fitting gloves is so important. As you can see, these gloves are too large. The extra latex at the end of each finger obscures the organs and makes fine manipulation more difficult. Also, the extra space around the wrist leaves room for fish tissue and preservatives to touch the skin. Conversely, gloves that are too small will also leave the wrist exposed, and may rip under the strain.

With that, the dissection is complete. Dispose of your fish and any detached tissue as directed by your professor, TA, or lab instructor. Clean your tools and dissection tray mat with soap and water, then remove your gloves and wash your hands.

Please feel free to rewind or rewatch this video before continuing to the next page in this module.