Guide to Creating a Learning Object

Physics 101

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Introduction

Learning Object

A resource developed by you that can be used by other students to understand and explore a question or concept in Physics 101. This object can be presented in any form including (but not limited to): word-processed documents, pictures, videos, screen captures, pen-casts, PowerPoint/ Keynote slides, etc…

Rationale

There is an old adage that 'you never really understand something until you have to teach it'. Explaining your own understanding of a topic or a concept is a great way to make sure that you really do understand it well enough to 'teach' someone else. It's also a useful way to construct new knowledge and enhance your own understanding further.

Former student comments

- "After doing this assignment, I felt like the concept was stored in my longterm memory. It's sort of like helping another classmate out. The more you explain, the more questions you make up on your own, the better you'll remember the concept."
- "The process of creating a question, solving it, and showing how to understand and solve the question helped very much."

Physics 101 requirements

- You will be required to submit two (2) learning objects over the course of the term, each worth 1.5% of your Physics 101 course grade.
- All students enrolled in the course are divided up into four (4) cohorts by tutorial sections, and assigned a due date.
- You **must** complete LOs in the two separate weeks that are assigned to you
- In addition to these two (2) weeks, you may submit up to **one** additional learning object per week. Your two highest scoring learning objects will be used to determine your mark.

Quick Start

The steps summarized here will help you to create your first learning object. A more detailed description of each step with examples and comments from former students will follow.

Step 1: Select a broad topic. Then refine it. First, select a broad topic that you understand superficially, but would like to explore deeper and understand better. Then, narrow it down into something more specific by looking at example problems from lectures, your textbook, homework, and the internet. **Note: the topic of your Learning Object should be based on the pre-readings of the week AFTER your LO is due.**

Step 2: Choose a concept/question to explore. Come up with an interesting question or concept that you think other students would benefit from learning about. Make sure you pick something that is manageable - it is far more important to explain a small topic really well than a large topic superficially.

Step 3: Write out your solution. If you selected a question, solve it and write out the solution. If you chose a concept, make notes about that concept. Use your notes and your solutions to guide the creation of your Learning Object, plan it out !

Step 4: Choose an appropriate medium. Choose an appropriate medium to present your learning object; you may mix as many mediums as are necessary to make your explanation complete. To start off, refer to the list of tools at the end of this guide.

Step 5: Refine your learning object. Go over the learning object to check for spelling mistakes, and readability. Each learning object should be complete, self-contained, and make sense. Finally, make sure your Learning Object sufficiently explains the concept you are trying to help other students understand!

If you're stuck at any step, or just want some clarifications just ask your question on Piazza and an experienced TA will help you.

Detailed Guide

Step 1: Select a broad topic. Then refine it.

As you do your textbook pre-readings for the upcoming week, take note of the section and chapter titles because they represent the broad topics your instructors will be covering in the next week. If you have trouble with any concepts, jot them down because they will likely become the basis for your learning object. To refine a broad topic and determine how best to explore and assess it, consider the examples provided in the lecture notes, the questions at the end of the chapter, and the online homework assignments. Your goal in picking a topic should be to target areas of physics for which you have the foundational knowledge to understand, but don't quite understand yet because it is unfamiliar or confusing material. While creating the learning object you will spend some time with the material and understand it better in the process. The figure to the right shows a schematic of how to choose the topic for your learning object.

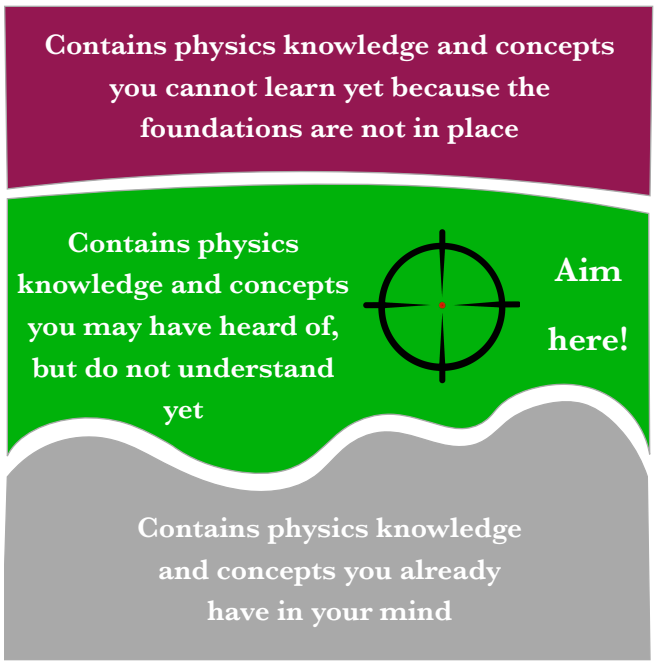


Figure 1. The box above represents a schematic of three areas of knowledge, and the target region you should aim for in this when creating this learning object.

Note: the topic of your Learning Object should be based on the pre-readings of the week AFTER your LO is due.

Former student comments

- "I remember that when I was doing the Pre-Reading, I was having difficulty understanding why the normal force and the force of gravity were not action-reaction pairs."
- "I was having trouble with the homework questions about conservation of energy, so I knew I had to learn more about it. That's why I chose the topic of conservation of energy, because it was going to help me with my course work"
- "I picked my topic by trying to remember what concept I had the most difficulty understanding and what topic students had difficulty understanding in terms of iClicker question."
- "I picked a topic that I was a little bit confused about, but knew that I would be able to get it once I break it down."
- I thought that other students might have had questions about this as well, which is why motivated me to choose the topic.
- "I chose the concepts that I found my friends were most confused about, ie, Potential Energy, Kinetic Energy, Conservation of Energy and better explained them."

Step 2: Choose a concept/question to explore.

Once you have refined your topic (from the pre-readings for the following week), your task now is to come up with a question or concept that sheds light on the topic you chose - this is the essence of the learning object. While we encourage you to come up with original content (marks will be awarded for originality), you may also extend, adapt, or combine existing content to produce something novel. Think outside the box, don't feel limited to just questions and concepts, you may select any kind of content that you feel increases understanding of a physics concept including but not limited to, famous experiments, simulations, worked problems, anecdotes etc…

Former student comments

- "I found a question that I struggled with previously and did it myself, then asked a related question in my learning object and found it very useful in forcing me to learn the concept."
- "I went through all of my online homework assignments (pre-lecture quizzes and assignments) to find the questions I had difficultly on."
- "I went through the textbook from that material and found a question I didn't understand so I constructed a similar question and solved it."
- "I searched the book for several minutes and then looked online at online homework assignments to see where my problems were and then worked on that."

Step 3: Write out your solution.

Your explanation and solution (if applicable) is perhaps the most important part of your learning object because other students will be using student-generated content to understand the course content better. Be sure to break down your explanation and solutions into smaller chunks. Use as many annotations and diagrams as you think will help make things clear, and concise. Don't forget to refer to the sample learning objects provided to get ideas on how to present your solutions and explanations.

Former student comments

- "After doing this assignment, I felt like the concept was stored in my longterm memory. It's sort of like helping another classmate out. The more you explain, the more questions you make up on your own, the better you'll remember the concept."
- "The process of creating a question, solving it, and showing how to understand and solve the question helped very much."
- "It helped me review the concepts involved in the topic I chose, and further my understanding of the material, as I was trying to create a solution to a problem for others to understand."
- "By fully writing out the processes and explanations regarding the action-reaction pairs, I felt I not only reviewed what I knew, but enhanced my knowledge from before."

Step 4: Choose an appropriate medium.

Presentation of your learning object can be accomplished in many formats including documents, pictures, videos, audio files, pen-casts, narrated presentation slides, animations, etc. At the end of this guide, we have provided a list of freely available tools for you to use when creating your learning object. You are certainly free to use other tools, but the learning object must be submitted digitally. If you have an idea about a particular format just ask for advice on Piazza. Keep in mind that the goal of creating learning objects is to help your understanding of physics concepts, and not to create masterpiece works of art. Do not spend a disproportionate amount of time on presentation, it is much more important to have a learning object with coherent and cohesive content.

Step 5: Refine your learning object.

Once you've put the finishing touches on your learning object, take some time to refine your learning object. Check for things like spelling, grammar, ambiguity, question clarity, explanation clarity, and a logical flow to your text. Double and triple-check your numbers (if applicable) to make sure there aren't any calculation or algebra errors. If you are uncertain about solution, talk to a friend, refer back to the textbook, or discuss with a TA or instructor during their office hours. Finally, ensure that your explanation is not just correct, but also complete. At the end of creating the learning object, our hope is that you increased your understanding of physics concepts (grey zone) and decreased what you cannot yet understand (red zone).

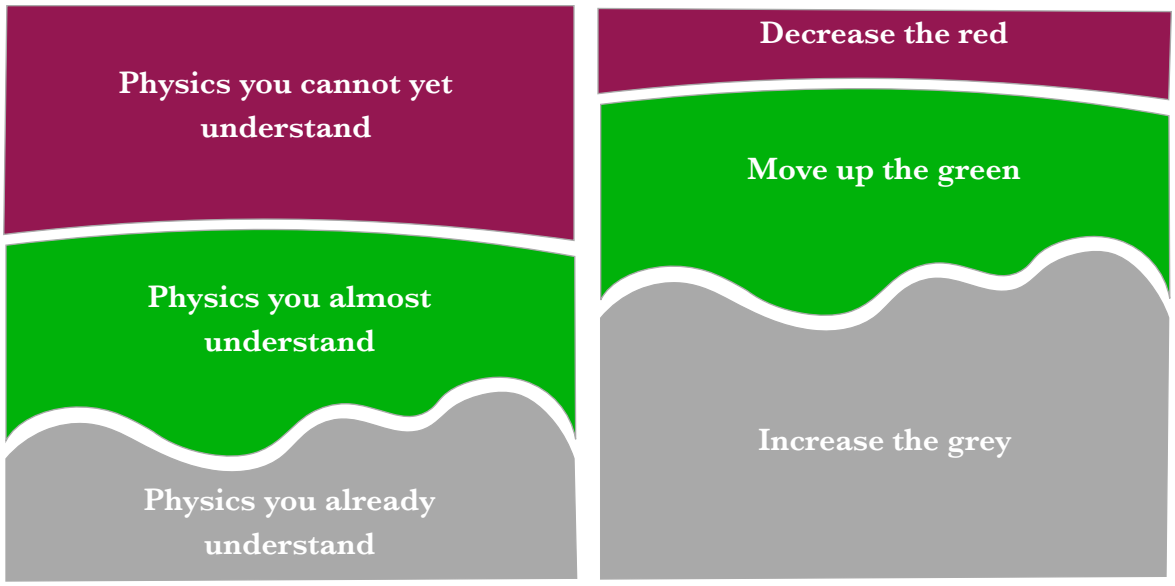


Figure 2. Your goal for creating the learning objects: Increase your grey region, move up the green region, and decrease the red region.

Frequently Asked Questions

1. **How long should it take for me to create my first learning object?**

   A complete LO could easily take a couple of hours or more to create and students who did this course activity previously reported that they spent this time or longer to craft a really good LO. Do not underestimate the planning and thinking time it will take for you to come up with your topic. Former students have some helpful suggestions and warnings for you about coming up with a topic:

   - "It took time to create the question, find pictures and creating proper explanation for other students."
   - "Trying to figure out a topic and question that would help future students and me understand the topic faster was what I wanted and that was also the trickiest part."
   - "While not challenging to make, it definitely took some time to come up with a topic that was suitable, and broad enough to make a question out of."
   - "I thought making the learning object was easy, it was selecting a topic I thought would be useful and informative without being too difficult for me to explain that I found challenging."

2. **How do I know if my solution is correct?**

   Refer to the lecture notes, textbook, and other sources to ensure that you understand the concepts you are discussing in your learning object. Discuss your content with your peers to make sure you don't miss anything!

3. **How much are learning objects worth of my Physics 101 grade?**

   The two learning objects will be worth a total of 3% of your Physics 101 final grade, each worth 1.5%.

4. **How do I know when my learning object is due?**

   Refer to the schedule at the end of this guide (page 10). To find your tutorial section identifier, simply log in to UBC SSC and find the three digit code for the section you are registered in.

5. **Where do I submit my learning object?**

   After you log in to the Physics 101 Connect site, click on "Learning Objects" on the left sidebar, click on the "Submit Learning Object" link. Follow the instructions and just remember that the feedback questions at the end are for statistics and it has no effect on grades.

6. **How come I can't submit files?**

   Unfortunately collecting individual files from each of you would be cost and resource prohibitive. We invite you to put your file on the cloud and submit a link to the file instead. In most cases, we offer suggestions on where to put your file so that we can automatically embed it into our website rather have a file downloaded. Popular free cloud storage solutions include Slideshare.net, Dropbox, Box.net, Youtube, Vimeo, Copy, SkyDrive, etc… If you have further questions, please post your question to the 'learning-objects' Piazza tag.

7. **Why do I need to submit a summary of the learning object?**

   The summary is important so that other students, TAs. instructors can find your learning objects easily. Each week we will be featuring the best learning objects for other students to enjoy.

8. **Are there any restrictions on the topic of my learning object?**

   Yes! You should create a learning object based on the pre-reading material for the week FOLLOWING your LO submission deadline. For example, if your LO is due on Sunday February 2nd, your LO content should be based on the assigned pre-readings for the week starting February 3rd.

9. **Can I use pictures/diagrams from the textbook, lecture notes, or the internet ?**

   Yes, but cite the source.

10. **Can I work with my friends to create a learning object?**

    Certainly! We encourage you to discuss with your friends/colleagues your ideas for learning objects. They can be invaluable when selecting topics and creating it. However, please be aware that while we encourage discussion and collaboration, we require that each student submit their own work. All UBC regulations on academic integrity apply.

11. Can I use a question from the online homework assignments?

You can use it as a base for creating your own learning object but make sure to adapt, extend, or modify it in a meaningful way. Simply changing the numbers around is not enough!

12. Can I submit more than one learning object?

Yes, you may submit more than the two learning objects assigned to you. Your two highest scoring learning objects will be used to determine your mark for the learning object portion of the course.

13. Where can I find learning objects from other students?

Each week, we will be featuring a few of the best learning objects and they can be found on the LO website (http://blogs.ubc.ca/phys101/). You are more than welcome to use these learning objects to understand the topics your instructors will be covering in lecture or prepare for midterms and exams. We will likely be choosing one LO for each of the midterms as well as the final exam.

14. I'm stuck, where can I get some advice?

Post your question on Piazza using the 'learning-objects' tag and someone will get back to you very soon.

Learning Object Deadlines

Learning Object	Pre-reading material for	Deadline Date (11:59 PM)	Sections
LO1	Week 4 (Jan. 26 - Jan 30)	January 25, 2015	LC2, LD2, LE2, LM2
LO2	Week 5 (Feb. 2 - Feb. 6)	February 1, 2015	L2C, L2D, L2E, L2M, T2B
LO3	Week 6 (Feb. 9 - Feb. 13)	February 8, 2015	LF2, LG2, LH2, LI2, LJ2
LO4	Week 7 (Feb. 23 - Feb. 27)	February 22, 2015	L2F, L2G, L2H, L2I, L2J
LO5	Week 8 (Mar 2 - Mar. 6)	March 1, 2015	L2C, L2D, L2E, L2M, T2B
LO6	Week 9 (Mar. 9 - Mar. 13)	March 8, 2015	LF2, LG2, LH2, LI2, LJ2
LO7	Week 10 (Mar. 16 - Mar. 19)	March 15, 2015	LC2, LD2, LE2, LM2
LO8	Week 10 (Mar. 16 - Mar. 19)	March 15, 2015	L2F, L2G, L2H, L2I, L2J

LO Assessment Rubric

All learning objects that you submit will be assessed based on the rubric provided below. Combined, the LO quality and explanation is worth 20/25 marks while the presentation is worth 5/25. Allocate your time wisely!

	Not Submitted (0)	Doesn't meet Expectations (2)	Meets Expectations (4)	Exceeds expectations (5)
LO Topic Quality		Identifies a topic that is either not relevant to the course, or either far too general or specific. Content is poorly expressed and the intent is unclear often with ambiguous interpretations. Difficulty of content is either far too easy, or far too difficult. Little evidence of any effort in adapting the content for the intended audience.	Identifies a focused topic that is relevant to the course. Content is well-phrased, with clear intentions and unambiguous interpretations. Difficulty of content is reasonable and requires some thought to understand fully. Evidence that content was adapted to suit this assignment (examples include: truncating an existing video and annotating it, explaining a part of a simulation, working through only the relevant parts of a problem)	Identifies a creative, focused, topic of strong relevance to the course; possibly addresses significant but less explored aspects of the topic. Content captures multiple topics in Phys 101 and makes connections between two or more distinct physical principles. Substantial evidence that work went into adapting the topic for this audience (e.g., base question was selected and improved with addition of parts, multiple learning sources were combined to help explain various parts of a topic)
LO Originality		Content highly derivative of existing material, e.g. from the textbook, or lecture notes. Reformulates a collection of available ideas	Some original thought was put into developing the content. Creates a novel or unique idea, question, format, or product.	Content is highly original. Explores a novel formulation of content, question, format, or product to create new knowledge or knowledge that crosses boundaries.
LO Explanation is present and correct		Explanation is either wrong, or obviously incomplete.	The core ideas are explained correctly, with all the major points addressed in reasonable detail. Minor aspects or peripheral discussions may be incorrect and/or gaps in connecting certain ideas may be present	Explanation is both correct AND complete. All aspects of the material are covered in adequate detail, and this may go beyond the boundaries of the course.
LO Explanation is clear, concise, and helpful for other learners		Explanation obviously lacks clarity, and presents comprehension challenges for learners. Explanation is basic but does not add any additional value for the learner. Explanations were un-original, possibly copied from the internet or textbooks or lecture notes. Diagrams were not supplied where they clearly would have been beneficial (i.e. text based explanation only)	Explanation is reasonably organized, and is digestible by and beneficial to learners if they put in some extra effort. Explanation is basic but may add some limited value. Explanations are likely mostly original and/or adapted from other sources. Some evidence of ensuring learners find the explanations valuable. Helpful diagrams were provided to illustrate a key concept	Explanation is very organized, and clearly laid out for consumption in a learner-friendly format. Explanation is sophisticated and adds meaningful value to learners. Explanations are completely original and care was taken to ensure that learners find the explanations meaningful. Helpful diagrams were provided to illustrate many key concepts
LO is Presented in a suitable and creative way with obvious effort		Chosen medium/media was poorly-suited for the type of content and style of the author. Content is not presented coherently, sensibly, or logically	Chosen medium/media was well-suited for the type of content and style of the author, however other options may have been available. Incorporates new directions or approaches to the assignment. Uses one medium to coherently, sensibly and logically deliver content	Chosen medium/media was perfectly suited for the type of content and style of the author Follows through on an untested and potentially risky direction. Uses a combination of available media to coherently, sensibly, and logically deliver content

Free tools for creating your Learning Object

You may use whichever tool you are comfortable with to make your learning objects. Standard software such as Microsoft Office, Apple's iWork, and OpenOffice are a good starting point. If you need additional tools to make your learning object more interactive, we recommend the following free software, but feel free to scour the internet for other tools (let us know on Piazza if you find something you think is great and we will add it to the list!)

Tool Name	Useful for:	Tutorial
1. Jing	Video screen captures, annotations, audio narration	http://www.techsmith.com/tutorial-jing.html
2. PowToon	Animated videos and presentations	http://www.powtoon.com/
3. TedEd	Starting from a YouTube video and creating a lesson with questions and video hints	http://ed.ted.com
4. Prezi	Unique presentations to deliver conceptual content one step at a time	http://www.prezi.com/support
5. Digiexplanations	Stop motion animation of still images to break down concepts in an easily digestible form	http://www.digiexplanations.com/

Convert your LO into an embeddable link

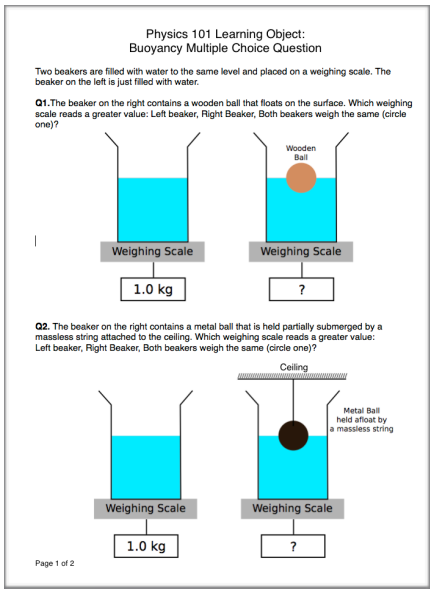
Once you create your learning object, depending on the format you choose, you will need to upload it on a third-party site so that you can share the link with us easily. This step is necessary to avoid storing large files on our servers and so that your LO can be easily viewed in-line on the website. Please make sure that your personal information (including student number) is *not* visible on your learning object.

Here are some recommendations, and guides:

Tool Used to create LO	Recommended Service to get Link or Embed Code
Documents (.pptx, .docx, .txt, .pdf)	slideshare.net ; Upload and submit the link into the submission box online (http://blogs.ubc.ca/phys101/submit)
Prezzi	Follow instructions here to get the embed code for your prezzi
Powtoon	Just paste the link into the submission box online
Ted-Ed	Just paste the link into the submission box online
Jing	Just paste the link into the submission box online
Video	Upload your video on youtube.com or vimeo.com and share the link

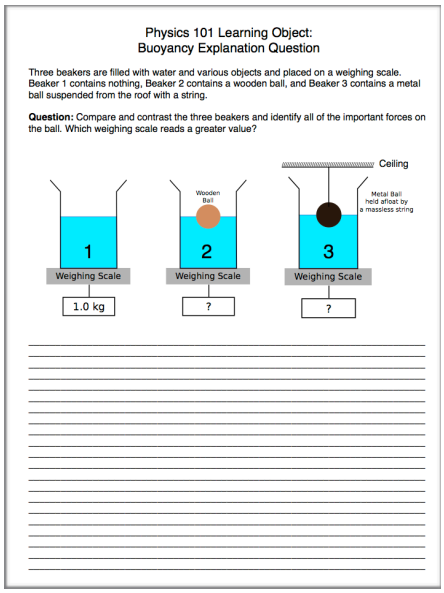
Sample Learning Objects

Sample 1: Multiple Choice Question



This LO about buoyancy is a multiple choice question that can be made on a basic word processor.

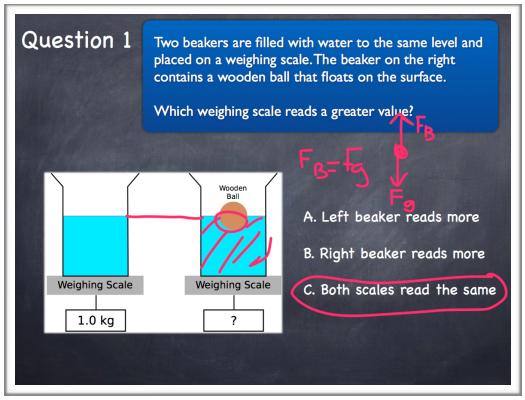
Sample 2: Explanation Question



This LO addresses the same topic as Sample 1, but the question is asked in a different (compare and contrast) way.

Sample 3: Slide + Jing + Skitch

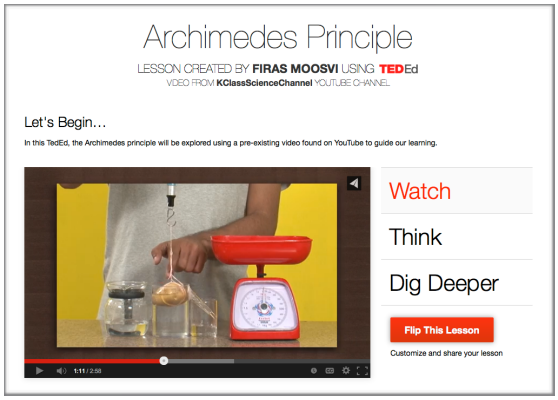
Link: http://screencast.com/t/WDQkd0bSBG



The question in this LO here is the same as Sample 1, but the explanation is provided using annotations on a PDF with Skitch, and an audio narration recorded using Jing.

Sample 4: TedEd

Link: http://ed.ted.com/on/ruMUgjcg



The LO object here was designed based upon a pre-existing YouTube video. First, the YouTube video is played in the 'Watch' section, then in the 'Think' section, multiple choice questions are asked and finally in the 'Dig Deeper' section, explanations are provided.