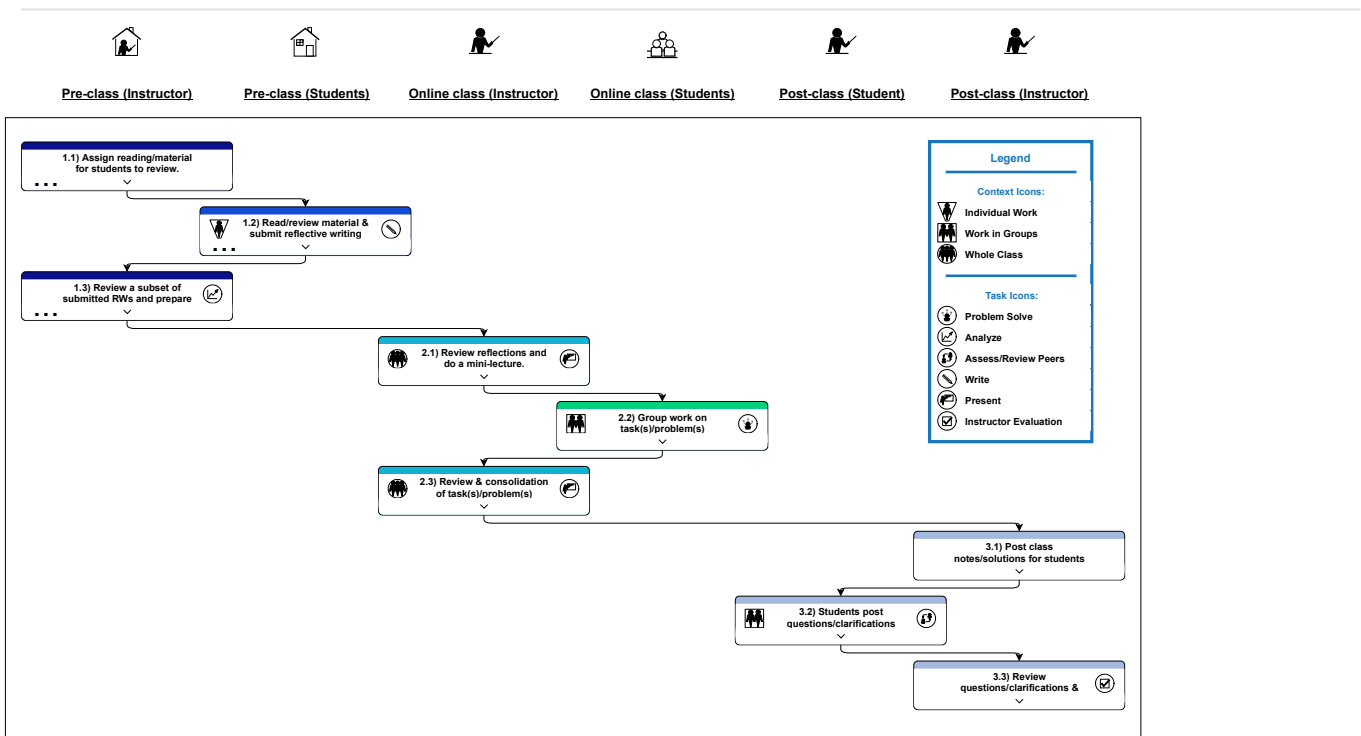


Designing engaging online classes - Flipped Classroom online lesson script

By Chris Whittaker

Courseflow

Online AL Script #1: Flipped class with group-work and follow-up



If you are looking to engage your students in an online environment using pedagogical approaches that are evidence-based but aren't sure exactly how to do it or aren't sure what tools you can use to make it happen, this script can serve as a helpful guide. It is a flipped classroom design that gets students doing pre-class work, engages them in small-group work during class, and follows up with a post class activity.

Specifically, this script is designed to:

- get your students working ahead of your online synchronous class by having them read/review materials and reflect on them in a pre-class assignment;
- provide you with an opportunity to glimpse into what your students are thinking so that you can make the most of your time with them;
- engage your students in purposeful and efficient group work during your synchronous class;
- follow face-to-face time with a chance for consolidation and feedback on a homework task.

Lesson script overview - Flipped class with group work

STEP 1: Asynchronous pre-class activity:

1.1. Instructor – Prepare and assign

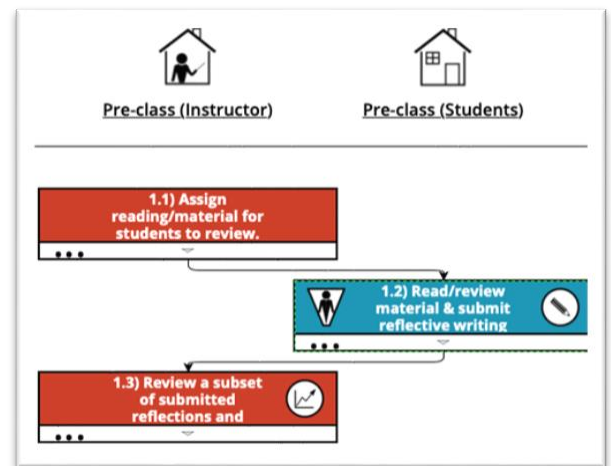
- Prepare and assign material (text, video, etc.) for students to review before synchronous class.

1.2. Students - Review material and submit a reflective writing assignment

- Review the assigned material (without formally studying it) and then submit written reflections on the things that were confusing/difficult.
 - Click [here](#) for detailed RW instructions to give your students.

1.3. Instructor - review student reflections

- Review a sub-set (approx. one third should do) of the RW submissions and use this to guide the preparation for the online class.
 - Click [here](#) for an example of how you might use RWs to start your in-class mini-lecture.



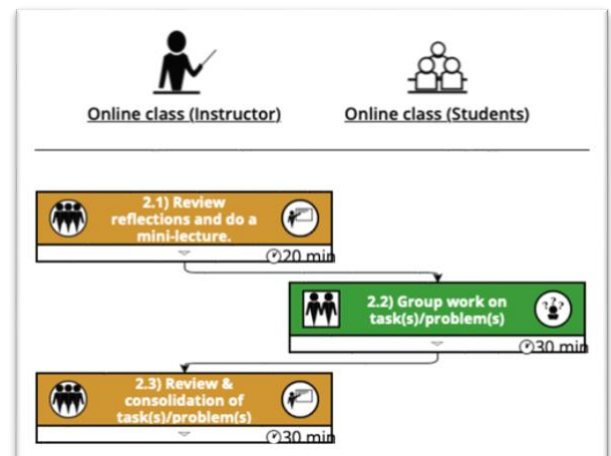
Step 1 tech tips for on-line learning:

- **Moodle** easily allows steps 1.1 to 1.3 to be done on-line. Click [here](#) to see how.
- **MyDALITE** easily allows steps 1.1 to 1.3 to be done on-line *but it adds a component of interactivity that allows students to see and reflect on each other's reflections*. Click [here](#) to see how.
- Both **Moodle** and **MyDALITE** also allow you to add multiple choice questions to Step 1.

STEP 2: Synchronous online class:

2.1 - Instructor – Review RW and mini-lecture

- Begin your class with a review of student reflections and do a mini lecture that addresses with what students found confusing/difficult. (This step should take about 20 minutes.)



2.2. Group work:

2.2.1. Instructor - Assign a task and set groups.

- Clearly specify:
 - 1) what you want students to do;
 - 2) what artifact you want them to generate (i.e. Google doc, scanned sketches etc.), and;
 - 3) how much time they have (less than 30 min. is probably a good idea).
- Monitor the students as they work in groups.

2.2.2. Students: Work in groups cooperatively on task(s)/problem(s) and produce the artifact(s) requested.

2.3. Instructor - Review and consolidate

- Review the task(s) along with the student generated artifacts and end the online class by consolidating what you want them to take away from the activity.

Step 2 tech tips for on-line learning:

- **Zoom** easily allows for the creation of breakout rooms where students can talk, use the chat and write on a shared canvas. Click [here](#) to see how.
- **Span** easily allows students to work on a shared canvas that is dynamic and accessed through a web browser. Click [here](#) to see how.

STEP 3: An asynchronous post-class follow-up:

3.1. Instructor - Post class notes and/or solutions

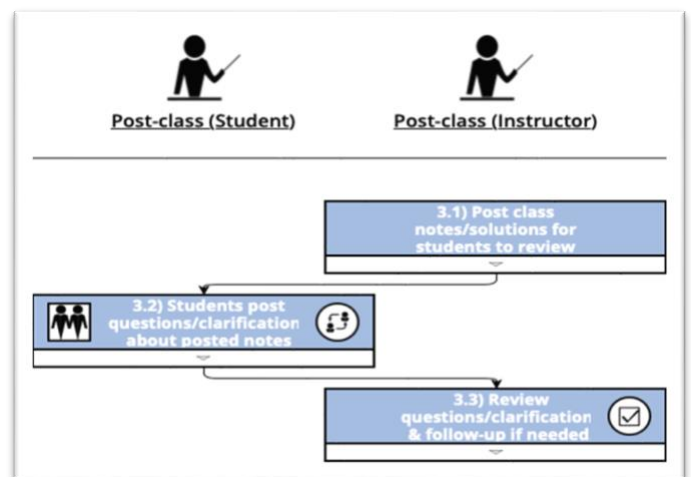
- Provide students with proper notes/ solutions so that there are no mistaken ideas/elements from the group work that you might have missed.

3.2. Students – Review and ask questions

- Review notes/solutions and then submit questions, reflections or ask for clarifications.

3.3. Instructor – Final feedback

- Provide students with feedback on common/persistent questions, reflections and provide clarification to the most important points.



Step 3 tech tips for on-line learning:

- **Moodle** easily allows **step 3.1** to be done on-line and then **Mio** or **email** can be used for **steps 3.2** and **3.3**.
- **Perusall** allows **step 3** to be done on-line in a dynamic and interactive way. Using Perusall instructors post PDF versions of documents and then have students collectively annotate them. Students can even help each other, and the instructor gets to see and manage it all through a web browser or Moodle module. Click [here](#) to see how.

For more detailed information:

- ➔ For a complete and detailed **flow diagram** for this script click [here](#).
- ➔ For details on the **What-Who-Why-How** for this script click [here](#).

Online AL Script #1: A flipped class with group work Summary Table:

What?		Who?	Why?	How?	
Step #	Action			Pedagogy & Orchestration tips	Tech tips
Pre-class asynchronous					
1.1	Assign material to read/review	Instructor	Reading before class streamlines what needs to be covered in class and activates prior knowledge which is an important first step in learning.	Give students enough time to read/review the material (note – they are not being asked to study the material in detail, but instead become familiar with it and identify where attention is needed.	<p>Moodle easily allows steps 1.1 to 1.3 to be done on-line. Click here to see how.</p> <p>MyDALITE easily allows steps 1.1 to 1.3 to be done on-line <i>but it adds a component of interactivity that allows students to see and reflect on each other's reflections.</i> Click here to see how.</p> <p>Both Moodle and MyDALITE also allow you to add multiple choice questions to Step 1.</p>
1.2	Read/review then submit Reflective Writing (RW)	Students	The metacognitive process of reviewing and identifying/explaining, in writing, what they don't understand helps focus students on the specific concepts or ideas they most need to clarify. At the same time, setting up a virtual dialog with the teacher increases the chances of an engaged and focussed learner.	Have students submit RW as close to class-time as possible so that it is fresh in their minds but with enough time for you to review – this could be the night before or several hours before class.	
1.3	Review subset of student RWs	Instructor	By better understanding where students are struggling, the teacher can target class-time for better and more efficient learning by matching the level of activities to student's readiness.	It is usually not necessary to review all RW submissions. After reviewing a third of the submissions, the instructor should have a sense of the main issues students are struggling with.	
Online class synchronous activity					
2.1	Review of RW and/or mini-lecture	Instructor	Reviewing RW, during class time, acknowledges the value of students' input and helps to make them feel empowered in the learning process and it validates the "risk taking" needed for learning by doing. A focussed and targeted review/lecture by the teacher improves efficiency of time spent in class, as a whole group, and creates the common-ground shared understanding needed for productive group work.	Try to minimize the time lecturing to students to 10-15 minute segments that are interspersed with activities that engage them in doing. It is also beneficial to explicitly use your review of the RW to guide the content and level of both the mini-lectures and the activities. The more students see that their input has an impact on your pedagogical actions, the more they will feel of sense of ownership and empowerment in the process – and that means more meaningful engagement in the learning process.	Zoom easily allows you to share your screen with others while you talk.
2.2	Split & monitor students in groups	Instructor	Working in groups (4-6 people) leverages the strengths of the individual group members and improves the success of the collective. Students generally feel more comfortable asking questions of peers than they do of the teacher. Groups can often serve as a support system.	Groups that are too small or too large can be problematic. There is no magic number when it comes to group size, but as a general guideline groups of 4-6 work well. As for composition, again there are no magic recipes, however, be wary of putting weaker or under-represented students alone in a group. For example, one weak student in a group of 4 strong students may not feel comfortable jumping in to contribute the way they should, or similarly, a single female student in a group of males might not work well. Pairing weak/under-represented students however can allow them	<p>Zoom easily allows for the creation of breakout rooms where students can talk, use the chat and write on a shared canvas in small groups. Click here to see how.</p> <p>Span easily allows students to work on a shared canvas that is dynamic and accessed through a web browser. Click here to see how.</p>

				to lean on each other and work together to engage in the group.	
	Group work on collaborative task	Students	Students can help each other and communicate what they have learned/understood in ways that often bridges the gap that exists between teachers (the expert) and students (the novice). By becoming peer tutors, students can often begin to understand more deeply because they are required to explain their thinking explicitly. By sharing the tasks among the group, students share the cognitive load required to complete complex tasks, thereby lowering the cognitive demands on any one individual.	Make sure to occasionally monitor what and how groups and individuals within each group are doing. Taking the time to do this will help groups stay on task, avoid getting stuck, and prevent frustrations from boiling over. Resist the temptation to step in and do/answer everything for a group. Try (when possible) to empower the group/members to work things out with the resources and knowledge they have. Try to nudge them along where you can.	
2.3	Review & consolidate	Instructor	It is very important that students get confirmation from the instructor that what they have learned is valid/correct. Without this consolidation, students may end up reinforcing false conceptual frameworks and/or have anxiety about the process and what they learned.	Don't try to cover everything here. Instead focus on the important points and the points that students were experiencing the most difficulty with. A more complete consolidation will happen in the next step when you distribute/post notes and/or solutions. Where possible, try to use the successful work of a group to illustrate the kind of work you are looking for.	Zoom easily allows you to share your screen with others while you talk, answer questions, and review key points.
Post-class asynchronous					
3.1	Post notes or solutions	Instructor	This step provides an additional consolidation step by providing students with an artifact that is more permanent in nature and that they can use to solidify their knowledge construction.	Try to post notes and solutions as soon as possible after class to maximize the desire students have to find closure on what was done in class. The longer you wait, the more likely students will be less engaged in their follow-up.	Moodle easily allows step 3.1 to be done on-line and then Mio or email can be used for steps 3.2 and 3.3 . Perusall allows step 3 to be done on-line in a dynamic and interactive way. Using Perusall instructors post PDF versions of documents and then have students collectively annotate them. Students can even help each other, and the instructor gets to see and manage it all through a web browser or Moodle module. Click here to see how.
3.2	Review and submit comments or questions	Students	By reviewing and submitting feedback, students are pushed to enact higher order cognitive skills like analyzing and evaluating while also providing an opportunity to consolidate and test their understanding through application of their knowledge.	Limit the window of time when students can submit comments and feedback so that their efforts are focussed.	
3.3	Review and follow-up shared and critical issues	Instructor	In this final step, the instructor can assess and address any lingering misunderstandings and alternative conceptions (i.e., misconceptions that interfere with future learning).	Focus on the essential points in your feedback to students and where possible, leverage other sources of information – such as verified videos, textbooks and even other students – so that students are empowered to find closure/answers.	

Reading Assignments: Reflective Writing

REFLECTIVE WRITING (RW) Instructions

Reflective writing is a way of reflecting on something you have read by writing in *free-form* – which means that you write whatever comes into your head without worrying about format, grammar or structure. Importantly, reflective writing is about what you *don't* understand: you free-write about the things from the assigned material that you didn't understand or had trouble with. If you understood everything in the assigned material, instead of writing a summary, try to link it with your own experiences and to things you've learned previously in this course (or others).

The purpose of reflective writing is not to show what you know. It's an activity that helps you understand what you *don't* know and relate it to things you're familiar with. It should help you figure out what you're having trouble with and where you need to focus your efforts when studying and asking questions in class.

If you think you understand everything in your reading, then say so, but **try scratching below the surface** – you probably didn't understand *everything* on first read! Explore the reading in more detail.

Lastly, make sure you try to link what you've read about with everyday life and the things you've learned before. Does any of what you've read relate to things you see in everyday life? Does it relate to previous sections or other courses?

How to complete a reflective writing assignment:

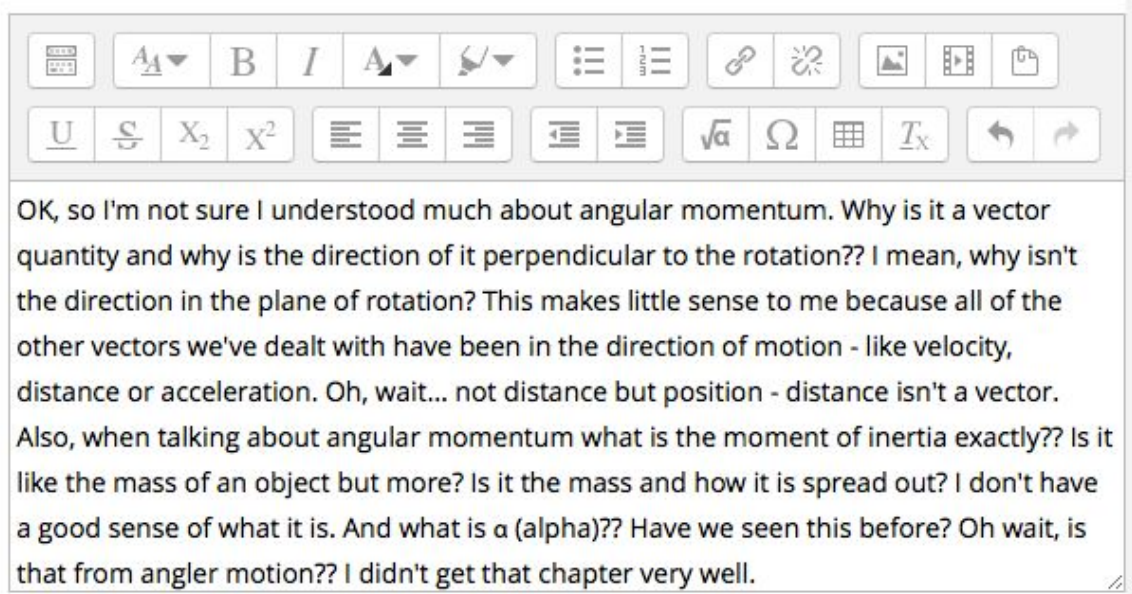
1. Review the assigned material(s) and while doing that:
 - Take notes if you like and highlight the things that you don't understand or that you need to have clarified.
2. *Free-write* about what you reviewed. To do this:
 - Write whatever comes into your mind about what you just reviewed. Write about what it means and what you didn't understand. Try to figure it out by writing. Ramble.
 - Don't write too little or too much – usually about 300 words will do per assignment.
 - Don't pay attention to sentence structure or grammar, and don't worry about spelling.
 - If you say something that you realize is wrong, don't erase it, correct it with another sentence. **Never erase** – just keep going (see sample below).
 - If at any time you get stuck, try not to stop writing, instead, write a nonsense word over and over again until you get unstuck (for example: "science science science science").

What reflective writing is NOT:

- Reflective writing is NOT essay writing. When you write an essay, you structure your thoughts and arguments in a purposeful way. When you do reflective writing you just blurt out what you're thinking on paper – it's not necessarily pretty.
- Reflective writing is not about what you know – it's more about what you don't know or what you don't understand. You will never lose marks for mistakes or errors in a reflective writing.

An example of reflective writing:

Here's a sample of what reflective writing for a particular section might look like in Moodle:



OK, so I'm not sure I understood much about angular momentum. Why is it a vector quantity and why is the direction of it perpendicular to the rotation?? I mean, why isn't the direction in the plane of rotation? This makes little sense to me because all of the other vectors we've dealt with have been in the direction of motion - like velocity, distance or acceleration. Oh, wait... not distance but position - distance isn't a vector. Also, when talking about angular momentum what is the moment of inertia exactly?? Is it like the mass of an object but more? Is it the mass and how it is spread out? I don't have a good sense of what it is. And what is α (alpha)?? Have we seen this before? Oh wait, is that from angular motion?? I didn't get that chapter very well.

A final note:

Reflective writing assignments are very different from what you are used to doing for a teacher.

Usually you are trying to show your teacher what you know and understand. In fact, teachers usually take marks off for the things you don't understand. With reflective writing you are doing the opposite. You are getting assessed for revealing what you don't know, don't understand, or what confuses you!

The first step in learning is to identify the trouble spots. You can't begin to learn until you identify what it is that you don't understand. Reflective writing is a tool to help you learn. Once you've identified what it is that you don't understand then you can work on fixing it. Most often the fixing comes after the reflective writing, although sometimes while you're writing you figure it out – that's OK too. Keep flushing it all out and go to a deeper level. If you figure out one thing then reflect on a deeper question that you don't get.

Remember:

- Do not submit summaries of the material reviewed;
- ~~AWs should not take too much time. You aren't being asked to study the material, only read it and reflect on it. It shouldn't take lots of time.~~

Reflective Writing (RW)

Reflective Writing is a way to get students to prepare for class:

- Students read sections of text or view video etc.
- Students “free-write” about what they struggled to understand and they “dig deeper”
- Students submit a short paragraph or two via email three hours before class
- I summarize/value a subset of their work and use it as the focus of my “lecture”
- Students get marks for completing RW – typically 3-5% of final grade.

Reflective Writing (RW)

Subject: rw 5

To: RW#5 (F2014)

Cc:

Overall, I am kind of confused, especially with the distinction between all the waves and their dimensions. Are wave fronts part of a circular and a spherical and plane wave? And for a circular wave, is it a two dimensional because it travels in the x direction, and oscillates in the y direction? On page 573, there is a displacement equation, $(d(x,t))$, however in the above section, a formula is used with the radial distance. When do we use each one? In addition, for equation 20.28 what is k? I kind of have a blank but I feel that ive learnt it before. In addition, what exactly does equation 20.30 mean? For 20.6, I generally understand how the intensity depends on the area also.

Reflective Writing (RW)

From: [redacted] September 9, 2014 7:07:00 PM
 Subject: rw 5
 To: RW#5 (F2014)
 Cc:



No, 2D means it travels in 2 dimensions - depending on the kind of wave it is (longitudinal, torsional...) it could oscillate in a 3rd dimension

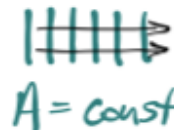
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Wave number (which is a number that reflects how a wave repeats itself over space).

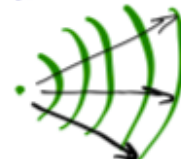
for a 1D wave - The energy has no way to dissipate (spread out) so amplitude = constant.
 For a circular wave that starts from a small source the wave spreads out and as it does the energy spreads out too so the amplitude changes $\Rightarrow A(r)$



1D wave:



2D wave



A is a function of r (distance from source) $\Rightarrow A(r)$

From: [redacted] September 9, 2014 7:49:26 PM
 Subject: Rw 5
 To: RW#5 (F2014)
 Cc:

No!

20.4: I'm a bit confused about the wave number (k). Is this just a number we give to a part of a wave? Like let's say "this part of the wave is wave #1" and that wave #1 has the distance of one wavelength? Is it like we number waves between wave planes that are one wavelength apart?

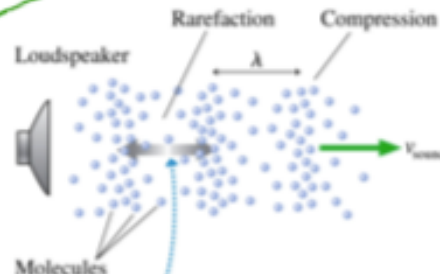
From: [REDACTED] September 10, 2014 9:55:57 AM
Subject: RW#5
To: RW#5 (F2014)
Cc:

Careful, you're confusing the wave propagation with the movement of the medium.



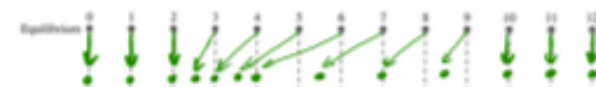
What exactly does a spherical wave refer to? How do they actually look like, sin curves or circles?? Oh and why is the textbook illustrating waves as planes and then also saying that they move in 3 dimensions? Right now, I really can't picture what the waves look like. Also, **im not sure that I understand figure 20.22. The loudspeaker moves particles which then generates waves? So waves are actually moving particles of the medium? Of air? I don't even know...** Moreover, I'm curious to know why the speed of sound decreases at lower temperature and increases at higher temperatures. And I don't understand why sound would travel faster across a solid or liquid than a gas? I mean, I am pretty sure that I can hear someone talking in front of me better than someone behind a wall?

Sent from my Android device



Individual molecules oscillate back and forth with displacement D . As they do so, the compressions propagate forward at speed v_{sound} . Because compressions are regions of higher pressure, a sound wave can be thought of as a pressure wave.

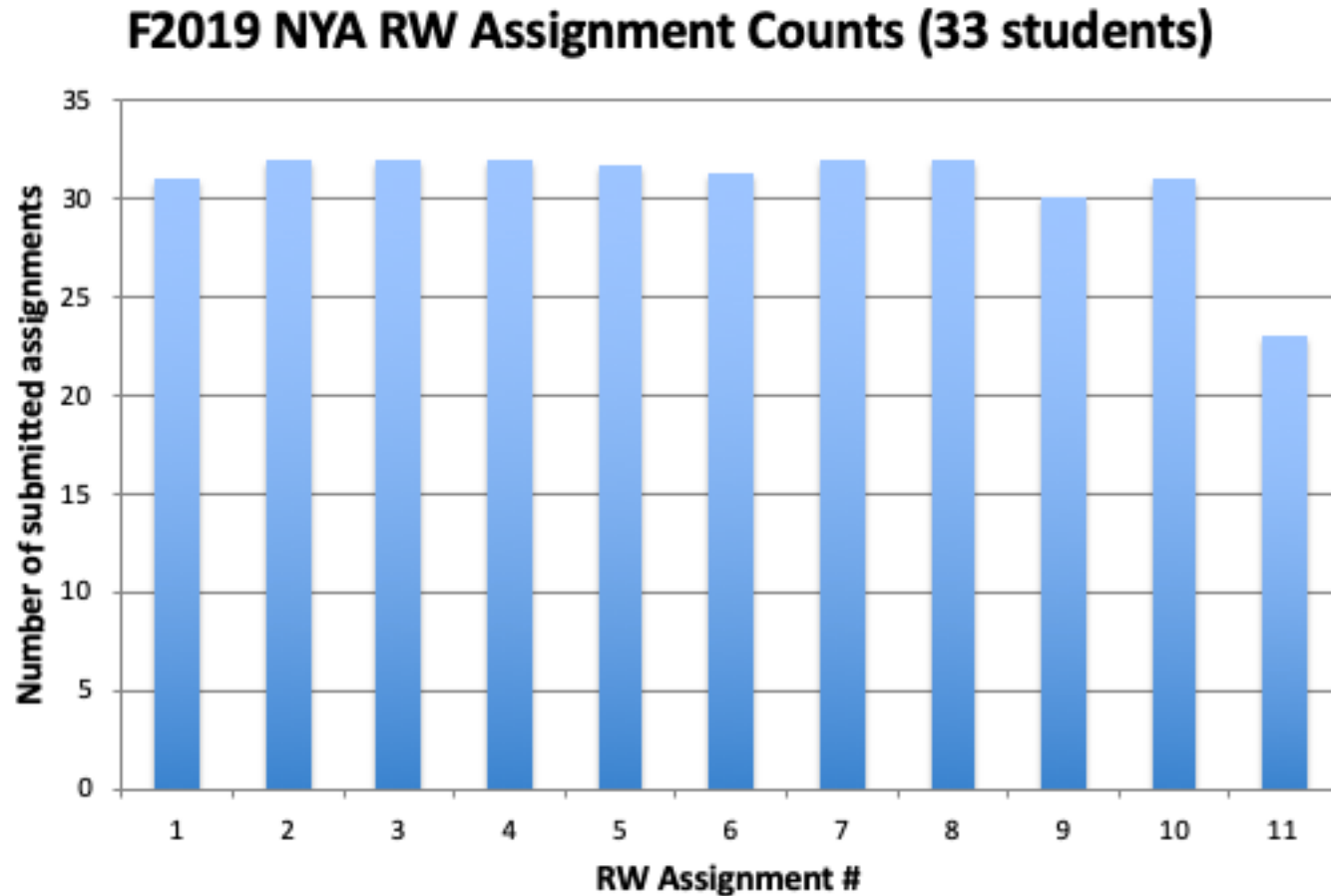
15. The graph shows displacement versus the link number for a wave pulse on a Slinky. Draw a dot picture showing the Slinky at this instant of time. A picture of the Slinky in equilibrium, with 1 cm spacings, is given for reference.



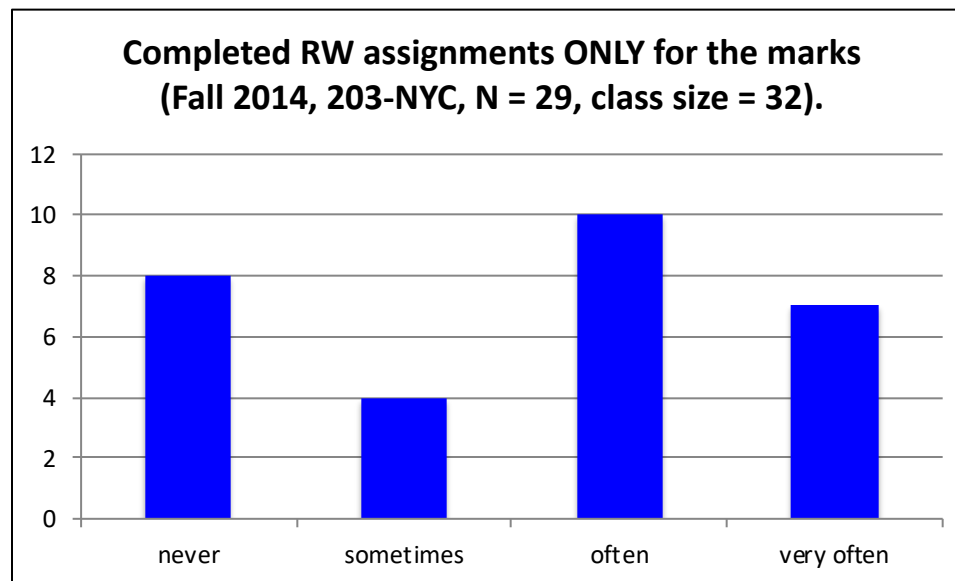
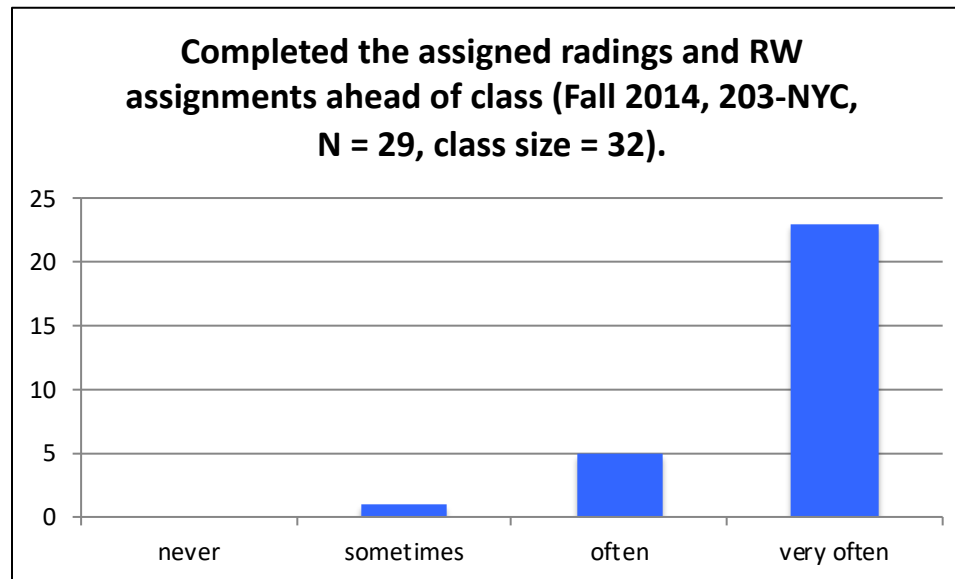
Note: we plot $D(x,t)$ as if it were a transverse wave BUT it's NOT!

Reflective Writing (RW)

Do they actually do the reading?

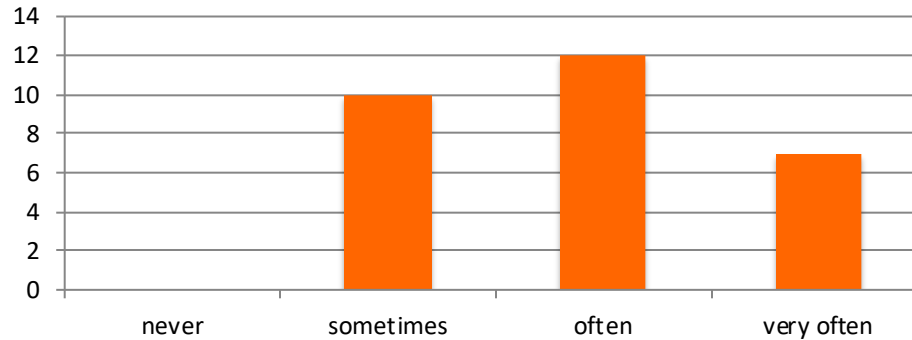


Reflective Writing (RW)

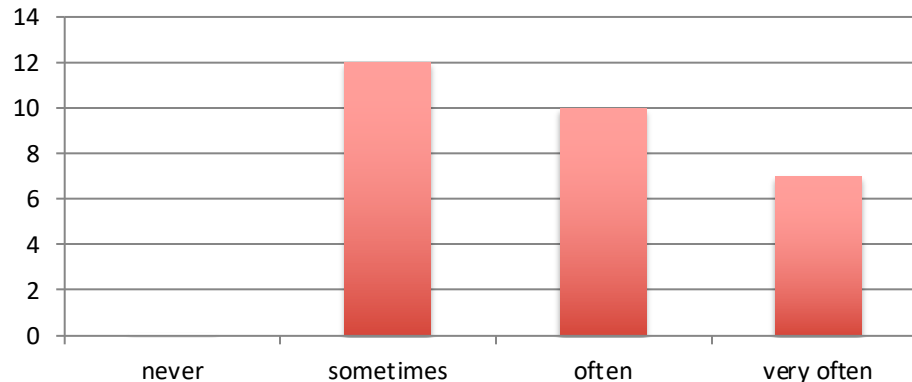


Reflective Writing (RW)

Came to class already understanding some of the material (concepts) because of the RW assignments (Fall 2014, 203-NYC, N = 29, class size = 32).



Participated in class because of the questions generated in doing the RW Assignment (Fall 2014, 203-NYC, N = 29, class size = 32).



Reflective Writing (RW)

Benefits:

- Improve and assess prior knowledge
 - Students come to class with better questions
 - Teacher knows where to focus attention
- Value process of reflecting on what isn't understood
- Improved efficiency of class-time
- Students get a sense that they influence what happens in class.