IRIS TEACHABLE MOMENTS SURVEY REPORT

https://www.iris.edu/hq/retm

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September 12, 2019

Executive Summary

- A survey link was sent to TM users to complete between July and November 2018; 184 people responded. Most of the respondents were teachers (70%) and mostly middle and high school and college; others present to the public or have a personal interest.
- Teachers think that the level of science presented was well aligned with their level of instruction (35%) or slightly advanced (35%). They say students ask questions about earthquakes (49%) like can we predict them, how do they cause tsunamis, what is happening in the Earth.
- Teachers report that Teachable Moments are useful for developing student understanding of key concepts (8.6/10), answering student questions about a recent event (9.0), stimulating discussions in the classroom (8.7), spurring students to investigate an event further (8.0), and increasing student engagement (8.5).
- Teachers report that Teachable Moments has increased the instructional time on earthquakes (59%).
- Teachers use the presentations as soon as they are available after an event (42%), within two or three days of an event (38%), when the topic comes up in the curriculum (32%), and when students ask about an event (23%).
- Respondents reported using the Teachable Moments presentation to develop their understanding (74%), to present to others (73%), to facilitate a discussion (38%), and as talking points for other presentations (16%). Other uses include showing preservice teachers, using for meteorology reporting, and informing the public as an official.
- Respondents reported really liking the graphics, the fact that the presentations are timely and use real-time data, that they are easy to understand at multiple levels, the in-depth content, how concise the information is, and that there is current information all in one place.
- Respondents reported that it is important (57%) to have Teachable Moments available within 24 hours of an event. Another 20% felt it was absolutely critical.
- Most respondents felt the technical and scientific content was at the right level (8.7/10).
- About a third of respondents use the presentations with no modifications. Another third report that they add or subtract a few slides (37%) and 13% use it to develop their presentations.
- Suggestions for additions include more pictures and video of the sites, comparisons to other earthquakes in the same region, the social context, having a live demonstration of the seismograph, having local tectonic information, fault inversion, information on aftershock probabilities, and latitude and longitude coordinates for earthquakes.
- Respondents gave high praise for Teachable Moments for its value to their learning, their audiences, and usable format.

Detailed Survey Findings

How do you use the presentations? Check all that apply.

N=184	#	%
Developing my own personal understanding	136	74%
Presenting to class/students	134	73%
Facilitating a discussion	70	38%
Use as talking points when interacting with the media or other groups	30	16%

Other (please describe)

- *The data that IRIS provides as I analyze it helps me determine what areas are going to suffer major earthquakes. It is realistic.*
- *Long-standing interest in unexplored phenomena*
- *No longer teaching, but interested*
- *Showing preservice teachers*
- *NGSS professional development on seismology with teachers*
- *I'm a TV meteorologist...use them to further explain things to my viewers.*
- *As an elected public official, to inform public policy decisions.*

What do you like best about the presentations? (see Appendix A for verbatim responses to this open-ended question)

Frequency analysis of comments	#
Graphics, real scientific data charts, 3D views, animations, images, embedded IRIS images, maps, visualizations, interactives, figures, beach ball diagrams, media, pictures, diagrams, illustrations	39
Timely, real-time data	33
Easy to understand, clear, variety of levels of understanding	30
Content: location, past earthquake info, historical aspect, magnitude, mechanisms of the quake, covers major geographic features, tectonic background, depth of tremor, direction of movement	24
Thorough, in depth, comprehensive, variety, explanations, detailed	21
Concise, succinct, give context	17
Correct information, all in one place, detailed, precise, well written, factual	15
Already made, can use directly with students	13
Standard format, consistent, initial overview, slides, organization, timelines	12
Tensor solutions, aftershocks, magnitude, seismographs, collective data tool, ground truth data, balance of graphics and text, zoomability	8
Ease of access	3
Easy to edit	3

How important is it for you to have a Teachable Moment available within 24 hours of a major earthquake?

	#	%
Not important	11	6%
Somewhat important	27	15%
Important	104	57%
Absolutely critical	37	20%

Is the technical/scientific content at the right/understandable level (scale of 1-10, 10 perfectly understandable)

Mean 8.7 Minimum 1.0 Maximum 10.0

Rating	#	Rating	#
1	2	6	7
2	0	7	9
3	1	8	41
4	1	9	46
5	3	10	65

How much modification do you normally do to a presentation? Check one.

	#	%
None	61	33%
Add or subtract one or two slides	67	36%
Just use the ideas in the Teachable Moment to develop my own presentation	23	13%

Other

- *Depends on the earthquake, but usually I use most of the slides, and remove almost all of the text. I'm teaching intro, so the beachballs are what I usually remove.*
- *How I use it changes as the year progresses and student understanding develops.*
- *I augment with news images of damage to demonstrate the effect on built environment.*
- *I discuss as I go through it; sometimes skip things my 11 year-olds wouldn't understand.*
- *I often combine with a few other slides of IRIS images for context.*
- *I teach in middle school so I have to take out a number of slides that are too technical.*
- *Pull out slides relative to my intro geology courses*
- *Some of each... sometimes use as is, sometimes add more*
- *Sometimes I use them as is; sometimes I add or subtract one or two slides.*

Is there additional content you would like to see included?

- *I like the Teachable Moments as they are. They work well and each one increases my understanding of the forces at work in a particular area and how that may impact my area of responsibility. (9)*
- *Always good to have pictures or video with impact from the event. Even a newspaper article. I know this is difficult with the timeline you are working. Students seem to be drawn into photos. (9)*
- *Comparisons to earthquakes in the same area or historic earthquakes. Maybe better visual distinction between historical earthquakes at different depths? I frequently open the EQ Browser to get a better look at the earthquake history.(3)*
- *Would like to understand the "beach balls" what do the colors mean? I've seen some with arrows, which helps, but I'm not there just yet. (2)*
- *Additional tsunami information. Why would one be possible or why wouldn't one be possible. Range. (3)*
- *Social context could help to explain response and damage. Updates later on total death count or damage. (2)*
- *A slide for Seismographs in Schools showing seismogram images of the earthquake from various schools around the globe.*
- *At the same time report on volcanic activity and tsunamis.*

- *Distribution data on how the quake in question ranks in intensity and with other seismic disturbances in the geographic area it is located. Yearly basis?*
- *Good as is, especially given requirement for immediate info. I generally try to add more human context, including especially images of damage, and discussion of building types and infrastructure in relation to damage.*
- *I am not a K-12 teacher but I do use these in presentations to various community groups, CERT and various emergency preparedness groups. Thank you for providing.*
- *I and the undergrads are usually most interested in the tectonic setting and characteristics of the earthquake more so than the maps of ground shaking.*
- *I like consistency, so maybe all follow the same format.*
- *I will say that I highly value the images, but that there is too much text on most slides and would be better presented as bullet points*
- *It would be great to have a simpler explanation of focal mechanism.*
- *Local tectonic information background*
- *Maybe a slide showing the plate movement from a side view with plates named with arrows pointing to their direction.*
- *Maybe a live demonstration of the seismograph.*
- *More maps. Maps that show the tectonic context of the events. Location map ("regular" not satellite map) showing the location in a larger context since we're not always very good at geography. Also, diagrams showing the event in the context of plate tectonics--i.e. plate boundary diagram with the earthquake focus, etc.*
- *Online background references*
- *P/S waves*
- *The P/P format is very engaging with the adults and youth.*
- *The volcanos*
- *This might be too much to ask for, but usually when I download these things, I have to complement with the fault inversion (if available from USGS), and "most recent important earthquakes" (e.g. when was the most recent large earthquake affecting the population).*
- *Would like to better be able to explain aftershock probabilities, the formula is complicated and not relevant to responders in the field.*
- *We plot these earthquakes on a classroom world map. It would be nice to have the longitude and latitude coordinates included. Please always include the boundary type(s) too.*
- *I like the explanation video along with the ppt. My teaching is mainly public education, so I use the knowledge to inform of our hazards, but I don't get down to the nitty gritty of each quake like you do. I really like the detail and I like that I learn from them.*

Are you a teacher?

	#	%
Yes	128	70%
No	49	27%

In a capacity other than as a teacher, we appreciate your comments and suggestions.

- *Thank you for providing this service. (6)*
- *Former educator, with continuation of gaining & sharing knowledge. We cannot prepare if we are not aware.*
- *I am a research scientist and professor. I use these slides as a quick source of scientific information about an earthquake and its setting. When an interesting earthquake happens while I am teaching I use it to develop understanding of actual settings and their complications.*

- *I am a tsunami scientist and use these slides to present the earthquake/seismological background of the event.*
- *I am no longer in the classroom, but I share the presentations with the current science teachers.*
- *I am not a teacher in the conventional sense of the word. I give a significant number of presentations on our coming Cascadia earthquake and tsunami. I present to public groups, service groups, and others who are willing to have a presentation. Being the …, I have a duty to try to educate the public on the hazards facing us, and how to prepare for that eventuality. These teachable moments assist me with that effort. Thank you for doing them.*
- *I appreciate this information as I'm talking with other people regarding changes in the Earth.*
- *I do many public presentations on the Cascadia Earthquake/Tsunami hazard. I get many questions, and I am grateful that I have learned enough to be able to capably answer them. While not a "teacher" per se, I am teaching the public (those who will listen, anyway) about the hazard and how to protect themselves/prepare for it.*
- *I don't know if I can break away from my teacher role. I think I would seek this out even when I am retired from formal teaching.*
- *I don't use the technical content much, as I feel only a few of my students would understand it. I do like it and do share it to further their understanding. I recently shared the Spanish version with our Spanish teacher. She will be using it later in the year.*
- *I have known IRIS as a resource for years, and have benefitted from having a seismograph in my room and a workshop experience in Kansas City. Thank you for all of it!*
- *I share the teachable moments with my afterschool colleagues often and have heard nothing but wonderful reviews. Thank YOU!*
- *I simply like learning about events, whether I will use them as case studies in teaching or not.*
- *I use the site only out of personal interest.*
- *I used for divulgation materials in the … Museum ….*
- *It is better information than I can usually find on the news!*
- *Love it! I'm a retired statistician who dabbles in seismology.*
- *More explanation of the waves/seismograph data.*
- *My job is in the …. Your information is very important in my job to present the information to regular people and sometimes students.*
- *Our biggest challenge is making scientific information actionable so that those in the field understand what ground rupture is, what fault slip is, that it means repairs will need to be repeated until it subsides. Search and rescue are dangerous, if we can provide any fault related information to help them stay safe, we certainly want to.*
- *Retired Geophysics professor - use for my own information and to discuss with colleagues and students but in an informal venue.*
- *Retired teacher, lifelong learner*
- *The presentations are valuable to our work on mitigation, preparedness, response and recovery in our coastal county in Washington State.*
- *Usually method 1.the Kp index. 2. a simple ruler.*
- *Would like to also have a non-tech version for adults w/out a science background.*

Teachers Only

What grade level are you using the presentations with?

Level	#	Level	#	Level	#
Grade 3	1	Grade 9	22	Public	2
Grade 4	5	Grade 10	23	All	0
Grade 5	4	Grade 11	29	Teachers	2
Grade 6	24	Grade 12	27	Rehabilitation Center	1
Grade 7	17	Community	9	Retirement Center	1
Grade 8	20	College	23	All	0

How well does the level of science presented in Teachable Moments align with the level of your instruction?

	#	%
Slightly Simple	3	2%
Well Aligned	65	35%
Slightly Advanced	65	35%

Do students come to class with questions about earthquakes they hear about in the news?

	#	%
Yes	90	49%
No	38	21%

If yes, what are some examples of their questions? If no, are they interested when you bring it up? Sample Questions – see complete list in Appendix B.

- *What caused that earthquake and why so some earthquakes cause a tsunami?*
- *Did our seismometer record it, what caused it?*
- *Did you hear about the earthquake in...?*
- *Will it happen here? Can we predict earthquakes?*
- *What kind of damage was there?*
- *Where was it?*
- *Can we predict earthquakes/ How well?*

When do you use the presentations? Check all that apply.

	#	%
As soon as they are available after an event	77	42%
Within two or three days of the event	69	38%
When the topic comes up in my curriculum	58	32%
When students ask about an event	43	23%

Other

- *I have taken data of past events and have had students plot them using lat and long data to look for patterns.*
- *In later quarters if there's something of particular interest.*
- *In my seismology team club.*

- *It is also a fabulous filler when we have a few extra minutes in class. I also like being able to go back to previous earthquake data sets.*
- *My class isn't taught every day, so there might be several days between the event, the teachable moment, and my class. But I incorporate the slides into my lectures as soon as possible.*
- *They don't, they can hardly breath much less use a computer.*
- *To compare older events to newer events.*
- *To develop divulgation materials, for example the dtravel of seismic waves I used in a class of graduate students of Physics and Earth Sciences for more than 15 years.*
- *When I interact with students.*
- *When I know an event has occurred in an area of interest to them.*

On a scale of 1-10, how useful are the presentations for (10=extremely useful, 1=not useful)

	Average
Developing student understanding of key concepts	8.6
Answering student questions about a recent event	9.0
Stimulating discussions in the classroom	8.7
Spurring students to investigate an event further	8.0
Increasing student engagement	8.5

Has use of these presentations increased the instructional time on current events/earthquakes in context in your classroom?

	#	%
Yes	108	59%
No	20	11%

If yes, how much? (in percentage)

	#
1 to 5%	15
10 to 15%	25
20 to 30%	13
70 to 80%	6

Comments/explanations

- *Teachable Moments allows me to easily add a few minutes for current events.*
- *I generally cover these events in any case, but especially appreciate the concentrated info in one place, that I can use as a start for my prep.*
- *15 minutes every major event*
- *We don't talk much about current events in math, so this is a great way to generate interest!*
- *Information is clearly presented, allowing a wider latitude of comprehension.*
- *Depends on event and duration of time to next class.*
- *Depends on how often an event happens. We can only allow about 10 minutes of a 50 minute class to cover the material.*
- *Field trips to affected areas*
- *I always am looking to add current events to my curriculum. I don't think I can really add a time element to this. I am willing to sacrifice class time to show relations from the real world whenever they happen.*

- *I normally look to see if I can find images or video showing the damage and add a human perspective.*
- *I used to spend 0 time on earthquakes (Physical Science teacher) but now that our curriculum is integrated they are easier to justify 10-15 minutes the following day after an event.*
- *It hasn't changed my instructional time, but it has made a great difference in my prep time - I no longer search through multiple sources for the information gathered.*
- *Plate tectonics are a part of the science curriculum. 20% increase in time used due to the presentations. They are worth the time*
- *The curriculum does not allow time for it.*
- *The increased time would be there with any current event of the level addressed by the teachable moments, but IRIS makes it much easier for me to be sure of my facts and to have good quality graphics readily available.*
- *They are the basis for 4th and 7th grade lesson sequences, but also figure into discussions of geology, energy, matter, etc., in other grade levels.*
- *They replace another current event contact.*
- *Unable to accurately give you a percentage - We plot the notable earthquakes that you provide presentations for. We analyze the trends in location, boundary types, and depth if we have access to the information.*
- *We do current science related events already so this is part of that.*
- *Your content is better than what I used to teach so I have just replaced the old stuff with your great resources.*

Any other comments or suggestions would be appreciated!
Suggestions

- *A slide with links to a couple of news videos of the event would be useful - that's one of the things I always look up separately.*
- *Don't dumb them down, keep the detailed scientific content. People can delete what they don't want to use on their own.*
- *For focal sphere representation add full focal sphere between block diagram and half focal sphere*
- *Getting your e-mail 24 hours after the quake is not helpful...we TV meteorologists need them immediately. Since this is not feasible, I have a suggestion: develop a web page with a map that shows you the most recent quakes, we then click on that quake, and it gives us the fault relationship in that area. This can all be set up in advance for the major quake zones. With this, we won't have to wait until the next day to get this information.*
- *Having reference to specific content in NGSS would be awesome.*
- *Advertising that you offer this via a piece in EOS might help to get the word out more to increase use. Also via social media (Twitter.) The recent IRIS gifs are amazing - e.g. the Indonesia quake moving through the US array – wow.*
- *I would just ask that the feature for turning the globe in many directions (to view the poles especially) would be reinstated. I watched the melt occur for years before it was reported on news/weather channels.*
- *Information too advanced for middle school students. Simplify for students. Include plates involved, show movement when possible.*
- *It would be helpful on the email announcements to have an indication of the seriousness of the event in human terms. E.g., the recent M8 event in Fiji which sounds devastating until one realizes that it's too deep to be even felt. I don't mind these being included if someone thinks of interest, but they are not of much interest to me in my teaching, and I'd appreciate not having to click thru and down load to figure this out.*

- *Could you format an 11 x 17 poster to go with the very large earthquakes? I don't have access to a larger printer but it would be nice to add these to the class bulletin board.*
- *I always like to review after an event. Sometimes I have noted that the Tsunami information, products are not appropriate. Each of the US Tsunami Warning Centers has its specific areas of responsibility. While the NTWC provides only products with alert levels (domestic products) for upper 48, Alaska and Canada (East and West), the PTWC provides both domestic services for Hawaii and US territories and commonwealths in Pacific in Caribbean and the British Virgin Islands, for other areas in Pacific and Caribbean it provides Tsunami Threat bulletins and it is up to each country to establish the alert level. All the US TWC products are now posted on Tsunami.Gov. For other regions, Indian Ocean (Indonesia, e.g. Palau), Northeast Atlantic and Pacific, there are other Service Providers, the US does not have responsibility.*
- *It would be great if there were more than one version, aimed at different age groups!*
- *It would be nice if the email link went straight to teachable moments.*
- *Would appreciate context/history of activity in the area.*

Praise

- *Thank you! (18)*
- *Keep up the good work. I really appreciate this information. You are educating educators as well as students. (15)*
- *Earthquakes are part of my curriculum. I want students to be excited about Earth Science. These are always great to use and to help students understand that earthquakes occur all of the time.*
- *Great resource. Now that geology standards have hit high school, many more teachers will be interested. Would be good to "market" the site to high school science departments.*
- *Great to get the information so quickly after the event. Each student has a current event map where we located and discuss all Earth Science related events. Diagrams, maps are essential for high school kids that have little knowledge concerning location of cities and plates.*
- *I don't suggest that you dumb them down, even though they are at a higher level than my students. I think they are so great, I say the climate community needs something exactly the same as this for hurricanes etc.*
- *I like the level they are presented at as it is helpful for me to increase my understanding. I show students what is possible to study when looking at earthquakes.*
- *I really appreciate the high quality resource being made available fee-free. It is a true gift. Thanks for all you do!*
- *I very much appreciate these presentations!*
- *I'm not a teacher but have relatives who are & I turned one of them onto this site for sharing with her students. Have enjoyed this site for yrs. Thanks.*
- *IRIS resources are amazing! They are my "textbook" while teaching units on earthquakes and volcanoes. Thank you!*
- *I *really* appreciate this resource, use it every semester in my teaching, in both intro and advanced geology classes as current events warrant, and do hope you can continue to provide it.*
- *Kids have the quakefeed app on their iPads so they are watching all year. Great to have resources to dig deeper in current events.*
- *Love having these available. Please continue to produce them.*
- *More pictures*
- *Nice work! These are useful, I'll be keeping an eye out for them.*
- *Please keep making these presentations! They are great current event add-ins that allow me to bring real world relevance to my students, which then makes geology relevant to them!*
- *Please keep making these presentations. They allow my students to stay informed about our dynamic Earth.*

- *Please keep up the GREAT work!! Your site has changed the way I teach Earth History.*
- *Since I teach at a middle school level and the topic is earthquakes is very introductory, I have to take out a bunch of slides (or not show them). That being said, because we live in EQ country, the topic is engaging and all EQs are related back to their question, "are we going to have an EQ here?"*
- *So glad for e-mail notifications so I can use them in relevant current event time capturing student interest and motivating them to share it outside the classroom.*
- *Such a valuable tool! Keep trying to keep it going and improving an already wonderful tool !!!!*
- *Tammy, you do an amazing job.*
- *It is a great help in a busy teaching schedule!*
- *The ppts are great so please keep up the great work.*
- *This project helps me and my students alike.*
- *I watch for these emails after an event.*
- *I really appreciate IRIS, Tammy K Bravo and the Teachable Moments.*
- *I've been using them for years.*
- *These are great because it emphasizes a point I make in intro geology classes - that we live on a dynamic planet.*
- *These are great.*
- *Very grateful for these teachable moments. They highlight need to be prepared for a major earthquake to occur in our area.*
- *Very much appreciate how accessible these presentations are, and how quickly they are produced.*
- *While I value the timeliness of the presentations, I understand that the people who create them need work/life balance and I would still feel that they are just as useful if they didn't come out quite so quickly. :)*
- *You do a great job! It has helped me as a teacher and it does a great job of explaining technical information in a visual manner that is also high interest.*
- *Your presentations are very helpful, on target, and lessen my workload.*
- *As we receive the information, my students are pin pointing the locations on a big map in the back of our room.*
- *They give my students lots of data to read and interpret. As the year goes on, their level of understanding deepens.*

Next Steps

Based on this feedback, the IRIS team has plans to address the suggestions made by users as described below:

Visuals

- Add pictures, video, and newspaper articles as often as possible to draw students in.
- Add a slide for Seismographs in Schools showing seismogram images of the earthquake from various schools around the globe.
- Provide more images, less text, and bullets with information.
- Provide a slide showing the plate movement from a side view with plates named with arrows pointing to their direction.
- Provide more maps that show the tectonic context of the events and a location map ("regular" not satellite map) showing the location in a larger context
- Provide diagrams showing the event in the context of plate tectonics--i.e. plate boundary diagram with the earthquake focus, etc.

- *Provide a slide with links to a couple of news videos of the event so users don't have to look it up separately.*
- Add full focal sphere or focal sphere representation between block diagram and half focal sphere.

Data

- Provide distribution data on how the quake in question ranks in intensity and with other seismic disturbances in the geographic area it is located on a yearly basis.
- Provide comparisons to earthquakes in the same area or historic earthquakes, including visual distinctions between historical earthquakes at different depths so users can open the EQ browser to get a better look at the earthquake history.
- Make it so users have complements to the downloads with the fault inversion that is available from USGS and the most recent important earthquakes.
- Provide longitude and latitude coordinate and boundary type so earthquakes can be put on a world map.

Explanations

- Provide a simpler explanation of *focal mechanism.*
- Provide more explanation about the "beach balls"
- Create a live demonstration of the seismograph.
- Provide more explanation of the waves/seismograph data.
- Make references to specific content in NGSS.
- Simplify information too advanced for middle school students; include plates involved and show movement when possible.
- Provide context/history of activity in an area.

Communication

- Advertise that we offer this via a piece in EOS might help to get the word out more to increase use.
- Use social media (Twitter.) to let people know about recent IRIS gifs like the Indonesia quake moving through the US array.
- Provide email announcements to have an indication of the seriousness of the event in human terms, e.g., the recent M8 event in Fiji which sounds devastating until one realizes that it's too deep to be even felt.
- Have the email link goes straight to teachable moments.

Conclusions

Most of the users of *Teachable* Moments who responded to the survey were teachers - middle school, high school, and college. Others present to the public or have a personal interest. Most of the teachers reported that the level of science presented was appropriate for their level of instruction, or slightly higher. They reported that students ask questions about earthquakes, such as, *Can we predict them? How do they cause tsunamis? What is happening in the Earth?*

Teachers also reported that TM are useful for developing student understanding of key concepts, answering student questions about a recent event, stimulating discussions in the classroom, spurring students to investigate an event further, and increasing student engagement. They reported spending more instructional time on earthquakes because of TM. They often use them as soon as they are available or within a few days of the earthquake, but may also use them when the topic comes up in the curriculum or when students ask about an event.

Beyond the classroom, respondents reported using TM to develop their own understanding, for presentations or discussion, in educating preservice teachers, for meteorology reporting and informing the public as an official.

The value of TM is how timely they are using real time data, easy to understand but have in-depth content in a concise format. They like getting them within 24 hours of the event. About a third use them as they are, another and another third modifies them before use. Their requests for more visuals and less text are being implemented.

Appendices

Appendix A: What do you like best about the presentations?

- *Ease of access*
- *I don't have to make them. Other great things include the fact that they are timely and easy to edit if needed.*
- *It gives a collective data total.*
- *Current information*
- *All*
- *Thorough, exciting for H.S. students to see real time data!*
- *The visuals and how quickly I have access to the PP.*
- *Timely, predictable standard format, animations, tensor solutions*
- *Concise summary of main info in a nice graphical format.*
- *Concise, in depth, and easy to understand*
- *Clear, Concise*
- *Comprehensive and consistent. Uses real scientific data charts*
- *The information about the earthquakes, past earthquakes, damage, magnitude, graphics*
- *Easiness*
- *The initial overview, the embedded IRIS images and 3-d views*
- *They cover a variety of different levels of understanding, from simplistic to complex.*
- *Time of release*
- *Simple. Clear. Good for lay person.*
- *The maps and images*
- *Clear, easy to understand, provides scientific info in an easy to understand format.*
- *They are extremely useful to illustrate the dynamics of seismic activity at MANY levels of sophistication.*
- *The maps*
- *Speed with which they come out. Information about the mechanisms of the quake. The historical aspect.*
- *Clear, timely, informative*
- *Very god graphics and explanations*
- *Very good - correct - high quality*
- *They are timely.*
- *They are ready-made and have all the facts in one place so I don't have to hunt down information from different sources.*
- *Their timeliness*
- *They are so timely!*
- *They are complete, they are informative, engaging*

- *The immediate information about earthquakes happening in our world. As we receive the information, my students are pin pointing the locations on a big map in the back of our room.*
- *Mix of technical and general interest*
- *Interesting and ready to go!*
- *Reliably available shortly after any major event. Cover major geologic features.*
- *Detailed*
- *They are succinct.*
- *The particulars of each individual fault / quake relationship.*
- *Relevance, timely, accessible*
- *Excellent graphics and most are appropriate for introductory students.*
- *Clarity about the technical information of the earthquake. This allows for discussing the information with confidence.*
- *Good graphics, simple to understand for all ages.*
- *The work is already completed for me!*
- *Thoroughly explains with maps, readings and data. Love the slides to use*
- *They contain the needed information in one place.*
- *The data is presented in such a way that you could present to a group of non-scientists and scientists alike.*
- *Timely, clear, and has lots of information in a small package*
- *Information is understandable.*
- *Assembles a variety of visual examples in one packe.t*
- *I liked the animations that showed the p and s waves that were released and went to the seismic station. It showed how fast they travel.*
- *Current and accurate*
- *Content and how quickly they arrive in my email*
- *Well-rounded and includes lots of info*
- *Visualizations*
- *Good summary*
- *They highlight that these events are occurring all over the world - and could happen here off our coast.*
- *I like the variety of data/graphs*
- *I can show them to my students.*
- *Very informative*
- *They are immediate, give context and arrive without my having to do anything.*
- *They explain the how/why of event...what kind of plate interaction, which plates, etc.*
- *They can be used for all levels of students.*
- *Map and interactives of plate tectonics*
- *That all the information is in one place!!!*
- *They are easy to show my students. The graphics are great. They are more detailed than I need but that is perfect to stimulate discussions.*
- *I like that they quickly supply all the science and location all in one!*
- *Real-time data*
- *They're ready-made.*
- *Completeness, great diagrams/maps, basic information*
- *Short and to the point. Usable for multiple ages.*
- *Informative, can use as a current event teachable moment for students.*
- *Detailed and easy to understand*

- *They are provided in a ready-made power point presentation form. Clearly stated. Good graphics.*
- *They are precise.*
- *I can edit them for my curriculum allowing for teachable moments.*
- *Maps*
- *They are timely and give a good background.*
- *Organization*
- *Great and clear information*
- *The science*
- *Explanation of what is happening, type of event*
- *Figures!*
- *Description of what happened geologically, the scales and past history in the area*
- *Aftershocks, world maps, seismographs*
- *Clarity & succinctness*
- *Science background*
- *Extremely informational exposing students to real life events.*
- *Solid science at an understandable level*
- *Excellent quality*
- *Imagery, depth of material covered*
- *Clarity. Ability to use for various levels of understanding.*
- *Ease of readability for non-geologists*
- *All the details*
- *All of the scientific information is right there.*
- *Timely, informative, great visuals*
- *Great combo of hard science, respectful (e.g. not too callous) disaster photos, public health/safety info,*
- *Timelines*
- *They are timely and well put together.*
- *The depth of knowledge, and the visuals.*
- *The way the information is presented. I like the organization and that any TM that I download will be organized more or less the same*
- *Cause of earthquake and the effects*
- *Depth of information including beach ball diagrams*
- *Everything!!! They are so informative and well put together.*
- *I like the basic level of the information and illustrative graphic that support the text explanations*
- *All the media and detail; that they come right after the event.*
- *Quick information*
- *Easy to follow*
- *Posted in a timely manner; good graphics & photos*
- *Scientific accuracy*
- *It is very zesty.*
- *It's good to explain things in simple way.*
- *The graphics*
- *Demonstration and elaborate explanation in respect of plates movements.*
- *Graphics, real world pictures, real time ground truth data*
- *Clarity, graphics, tectonic background*
- *The clear information*
- *Graphics*

- *Everything*
- *The fact they are topical and relevant.*
- *Very good overall description & explanation of earthquake.*
- *Quick, clear diagrams*
- *The videos & slides are AMAZING!*
- *because there are very good*
- *Clear and concise*
- *The illustrations*
- *Comprehensive data in a compact format*
- *Easiness*
- *They are easy for me to pull up as an opener for my Earth Science students.*
- *Well written and scientifically sound.*
- *Clear, visual, detailed*
- *Easy to understand, but also detailed and substantial knowledge imparted.*
- *Great images, easy and informative explanations*
- *Historical and tectonic background*
- *Short and clear*
- *Clear and data rich, good illustrations from which good discussion can branch off*
- *How quickly they come out and how factual they are.*
- *They are current and well formatted. They give my students lots of data to read and interpret. As the year goes on, their level of understanding deepens.*
- *All the work is done for us!*
- *Easy to use and understand*
- *They are clear and contain all of the info I wish*
- *We get these very quickly after the earthquake occurs.*
- *"IT IS REALISTIC"!*
- *Learning about the importance of depth of tremor, plus that plates are twisting rather than moving linearly.*
- *Data and software*
- *INFORMATION AND GRAPHICS*
- *Clear maps*
- *Simplicity*
- *Clear explanation*
- *Clear and timely explanations, diagrams and animations.*
- *Good combinations of graphics + text*
- *Zoomability to latest quake*

Appendix B: Student Questions

- *What caused that earthquake and why so some earthquakes cause a tsunami?*
- *Did our seismometer record it, what caused it?*
- *Did you hear about the earthquake in...?*
- *Will it happen here? Can we predict earthquakes?*
- *What kind of damage was there?*
- *Where was it?*
- *Can we predict earthquakes? How well?*
- *Are tsunamis weather related? Why do some produce tsunamis and others don't. At what point can we feel them?*
- *Can an earthquake in Indonesia trigger one in our region (Lesser Antilles, Caribbean)?*

- *Can this happen to us? Warning tools?*
- *Causes, and where is the earthquake location*
- *Did we record it?*
- *Did you hear about it? Why did it happen? Will there be a tsunami? How do scientists know the plates move?*
- *Did you hear about the earthquake? Does this mean we are going to have an earthquake? Why was there an earthquake? Why did so many people die? Can we predict earthquakes? What is the difference between an earthquake and an aftershock? Why are people sleeping outside? What is a tremor? How did is that earthquake? What is liquifaction?*
- *Did you hear about? Have you seen the video on the liquefaction in Indonesia?*
- *Home town worries (Seattle and Vancouver)*
- *How big was it? How many people died? Was there a tsunami?*
- *How does it compare to possible earthquakes in California?*
- *How does this event relate to what we have discussed/are studying? Historical perspective.*
- *How far away was the earthquake from us? What kind of damage was there? Was there a tsunami warning? Will there be more earthquakes?*
- *How this relevant to local conditions?*
- *Human impact - death toll etc.*
- *I incorporate these when I discuss current events at the beginning of my class sessions.*
- *I talk about current events in my classes and by the middle of the semester, some students are looking for them as well.*
- *I teach at a CC along the San Andreas fault, so most questions are "could/will it happen here, when will it happen, etc.?"*
- *If it is in the news they sometimes ask.*
- *Interested when I mention them*
- *Many don't hear about the earthquakes, but they are interested to learn about them. It generates a lot of conversation and questions.*
- *More information about type of earthquake - and damage it caused*
- *Most often: will there be a tsunami?*
- *Mostly about whether this earthquake will cause others, or cause volcanic eruptions.*
- *Problems, at the border of tectonic plates*
- *Relative effects of earthquakes, why more or less damage*
- *Sixth graders mostly come to class telling me there was an earthquake at whatever location. They don't usually have knowledge until I use the presentations and then students can make connections or ask if new earthquake was like the one that happened last time.*
- *Sometimes if it makes the news/twitter*
- *Sometimes, usually not unfortunately*
- *They first ask where it is located on the globe, then they want to know about the strength, then about damage.*
- *They have a hard time understanding depth of an earthquake.*
- *They have many family members who live in areas of Mexico and South America that experience a number of earthquakes. We are also located on the San Andreas fault.*
- *They like to learn more, understand the damage, the causes and effects.*
- *They mostly inquire about the boundary types and damage.*
- *They seem to be interested when I bring it up.*
- *They usually ask where in the world it is!*
- *They usually want to know about tsunamis. Was there one? Why or why not?*

- *They want to know mag of earthquake - where it was located - what type of plate it was on - they want to look at maps.*
- *They want to know what type of earthquakes can occur where we live (I teach at an International School in …). They are also interested in how tsunamis work and volcanoes.*
- *Too wide of a variety to address here! Everything from human impacts to tectonic details.*
- *Type of earthquake, effects with distance*
- *Was there an earthquake?*
- *Was this a surprise or did you know it was going to happen?*
- *We live in California, so we get questions all the time.*
- *What caused the earthquake yesterday? Did you hear about the earthquake on the news, what can you tell us?*
- *What does it look like there?*
- *What is the scale of damage, and why?*
- *What kind of plate boundary is that? Is that a known earthquake area?*
- *What specifically happened? What is the geology, plate tectonic context behind this event? Often, they are curious to know more, but don't really know how to articulate specific questions.*
- *What type of earthquake was it? How does the location affect the damage?*
- *When will the Cascadia Subduction Zone quake occur?*
- *Where exactly it occurred, Richter scale, depth, fault type & kind of damage*
- *Where was it? How big?*
- *Where was it? What caused it? What type of destruction was there?*
- *Where? Why?*
- *Why has activity in the Ring of Fire Increased, what is the significance of fracture zone quakes, why are most earthquakes in coastal regions mostly?*
- *Why it happened, what kind of zone it was in. (Yes, they understand faults and subduction :)*
- *Why did the event happen? Will there be aftershocks? Why did this happen?*
- *Why there? Damages?*
- *Why was it that big? How far does the damage go?*
- *Why we cannot forecast earthquakes?*