**Project Name:** Geoscience Communication Practice in B.C.

**Version of Recording Instructions:** 6

Please read the entirety of this document before starting coding.

# Table of Contents

## Getting Familiar with the Database:

1. Open the Geoscience Communication Practice Intercoding Excel database

    a) Each row under the "Website" column will include a URL corresponding to a unique geoscience communication practitioner's website. You will use this website when following the directions under "Coding Objectives" and "Coding Activities".

    b) Categories: The "Categories" heading corresponds to the categories described in Table 1 and the associated key terms. These categories will help you code the activities. Codes will be entered in the cells from row 9 onwards and column O onwards.

    c) Research Focus - Objectives: **When coding for Model Objectives, you will include the numbered codes under the "Deficit", "Dialogue", and "Participatory" headings** within the "Objectives – Data & Summary" heading under "Research Focus. Under the headings "*", this is where you will paste any relevant information (words, sentences) that assisted you in determining the corresponding code. Please only paste directly from the website and use quotes to show this is directly from the website. If you need to explain your decision using your own words, please include a "#" before your comment.**

    d) Research Focus – Activities: Do not enter any data in the "Activities-Summary" heading under "Research Focus".

    e) Under the "Activities – Data" heading. The following is important, so please read closely. **When coding for Model Activities, you will input data under the abbreviated headings "D", "X", and "P".** D is for deficit, X is for dialogue, and P is for participatory. **You will also notice that there are headings with the * symbol. Like above, this is where you will paste any relevant information (words, sentences, images) that assisted you in determining the corresponding code. Please only paste directly from the website and use quotes to show this is directly from the website. If you need to explain your decision using your own words, please include a "#" before your comment.**

## Before Starting to Code:

1. Please enter the "Version of Recording Instructions Used" into the database. The version number is at the top of this document.
2. Make sure you are only coding websites with your initials assigned.
3. Copy and paste the URL in the website column and paste this into your preferred search engine.
4. Print out Table 1 and the Codes component of this codebook; have a copy of these beside you while coding.

## Key Terms & Introductory Information

*Table 1. List of relevant key terms for content analysis including the term, its definition, and an anchor sample*

| Category | Term | Definition/Description/Components | Anchor Sample/Examples |
|---|---|---|---|
| Medium | Science Media | In the form of radio, television, the internet, and hand-held devices are pervasive and increasingly make science available to people across venues for science learning. (National Research Council, 2009) | Traditional print media, traditional broadcast media, new media |
| Medium | Programs for Science Learning | Takes place in schools and community-based and science-rich organizations and includes sustained, self-organized activities of science enthusiasts. (National Research Council, 2009). | Workshops/training, supplemental resources, festivals/science events |
| Medium | Designed Settings | Supports science learning through museums, science centers, zoos, aquariums, and environmental centers. Rich with real-world phenomena, there are places where people can pursue and develop science interests, engage in science inquiry, and reflect on their experiences through sense-making conversations. (National Research Council, 2009) | Aesthetic/didactic, hands-on, and immersive exhibits |
| Resources | Traditional Print Media | One of the oldest and most basic forms of mass communication through written media. | newspapers, magazines, publications, books, worksheets, handouts, lesson plans, reports, statements and other written forms of media |
| Resources | Traditional Broadcast Media | One of the oldest and most basic forms of mass communication through audio and visual media. | television, radio, music, movies, videos, slideshows (like PowerPoint) |
| Resources | New Media | New media are communication technologies that enable or enhance interaction between users and between users and content. | Apps, Podcasts, webinars, Blogs, Wikis, eBooks, virtual reality, gaming, interactives |
| Resources | Workshops/Training | An in-person meeting through a *program for science learning* or a *designed setting,* where a group explores some subject, develops a skill or technique or carries out a project. | Workshops, training, courses, professional development, field trips, hands-on experiment |

| | | | |
|---|---|---|---|
| Resources | Supplemental Resources | These resources are those offered through a program for science learning and can't be categorized within the "Workshops" or "Festivals/Events" categories. Often these are used to reinforce, enrich, or extend understandings. | Recipes, games, test kits, toolkits, data collection, database, data platform, citizen science |
| Resources | Festivals/Science Events | Often one-off or special events that celebrate science in a community setting. Typically are designed for people of all ages and backgrounds. | Camp, career fair, guest speakers, consensus conference, citizen jury, science café, science shop, comedy, community events |
| Resources | Aesthetic & Didactic Exhibits | Visitors apprehend exhibits through contemplation, reflection, text-based, cases, and murals. | Collections, displays, interpretive signage |
| Resources | Hands-on Exhibits | Visitors apprehend exhibits through low technologies and interactive activities. | Tours, workshops |
| Resources | Minds-on & Immersive Exhibits | Visitors apprehend exhibits through problem-solving, discussion, exhibits that ask questions, and reconstructions allowing visitors to become part of the exhibition. | Experiential exhibits |
| Audiences | "K-12" (K-12 students/youth) | Refers to youth between the ages of 5 to 18 years old, and does not necessarily associate youth with the formal education system. | K-12 students, youth, kids, teens, children |
| Audiences | "Teach" (Teachers) | Those who teach at a school (not at the post-secondary level). | Teachers, educators, instructors |
| Audiences | "GP" (General Public) | All of the people within a society. | Public, general public, |
| Audiences | N/A | Term given when a particular target audience is not specified. | Not specified in text |
| | Geoscience | The science dealing with the Earth. | Atmosphere, biogeography, cartography, caves, climatology, ecology, engineering geology, environmental geoscience, geochemistry, geochronology, geodesy, geoinformatics, geologic history, geomagnetism, geomicrobiology, geomorphology, geophysics, geoscience careers, geostatistics, geothermal, glaciology, hydrogeology, hydrology, hydrometeorology, Indigenous knowledge (on geoscience topic), metamorphism, meteorology, mineral deposits, mineralogy, mining history, natural hazards, oceanography, paleoclimatology, paleontology, petroleum, |

| | | | petrology, physical geography, planetary geology, plate tectonics, rocks, sedimentology, seismology, soils, stratigraphy, structural geology, volcanology |
|---|---|---|---|
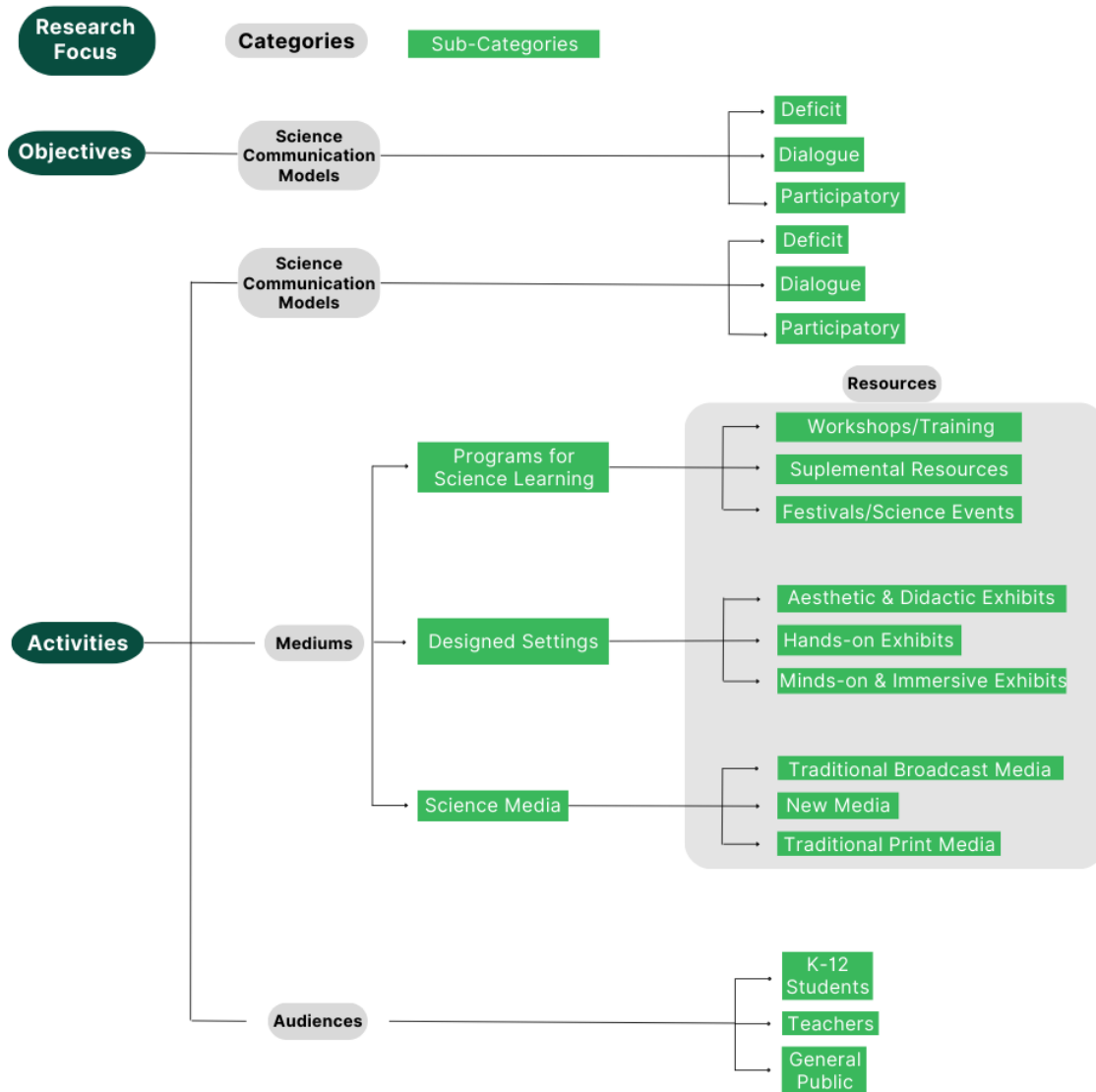
*Figure 1. Schematic highlighting the relationships between the focus of research questions, categories, and sub-categories.*

General Coding Instructions

## Coding Objectives:

1. You will need to focus on different parts of the websites at different times during your coding.

2. **Details for where to find objectives:** First, you will code for model objectives. Typically, information regarding objectives or goals is included on a website's "Mission", "About", "Vision", or "Home" page. If these pages are not titled using the words above, please use your discretion on whether the page would be relevant. For example, a page titled "Purpose" would likely be relevant, whereas a page titled "Resources" would not. Though we use the term "page", this may also be website headings, tabs, etc. Please venture to one of these pages on the website now.

3. **Details for Coding Objectives:** Regarding what data you will use to code, you may use specific words, sentences, or paragraphs found on a relevant page of a website. You have been provided with a list of words/phrases associated with the deficit, dialogue, and participatory objectives. This list can be found here. If you come across text that includes these exact phrases, individual words, or synonyms (as found in Thesauras.com) of these words, proceed to code. The codes for objectives are located here. Note that in some cases (e.g. museums) they may not have specific objectives relating to geoscience. That is okay, we will assume that their broad objectives apply to all services they offer. You can use a single sentence or phrase for more than one code. However, if you do this, please bold the relevant portion of the text that was used to determine the code being applied in the * column.

4. **Details for Coding Objectives (Semantics):** In some cases, the phrases/words found in the *terms* section may not be the same as the text. In these cases, please use your judgment on which phrase would most closely represent what the text says. For example, you may come across text in a mission statement stating, "To act as an umbrella for one-stop precipitation information nationwide." No phrases specifically match this, however, this would most closely relate to the dialogue phrase "to make science accessible". A list of examples of semantics found on websites and related to the model objectives has been provided for your convenience.

5. **Details for Including Qualitative Data Associated with Codes:** If you include a code for an objective, you **MUST** enter the associated qualitative data (words, sentences) used to make this decision under the **\* column directly to the right of the code you just entered.** Please only paste directly from the website and use quotes. Using the "#" symbol, please write the corresponding "term" you used to decide on the code. For example, if you decide that a website that says their goal is "to teach students about …" then you would quote this under the * column and put a #educate at the end. Note that "to educate" is one of the terms listed under the deficit model objectives. In addition, please colour relevant components of the qualitative data in red.

   *Note: As you include data under the * column, the column will get larger. Feel free to adjust the width of the column to whatever size is most comfortable for you.

6. **Details for category levels to be coded:** You may code each model objective up to three times. This is represented by, for example, the "Deficit 1", "Deficit 2", and "Deficit 3" headings. Please note that for one model to be coded more than once, a different model term must be used for each code. For example, if a website states "to provide information, educate, and inspire" this

could be coded three separate times for the deficit model because these are three different model terms.

7. Once you have checked for deficit, dialogue, and participatory model objectives (note that none, some, or all may be present), included the code in the database, and included the relevant qualitative data, you are **DONE** coding objectives for the website of interest, and can move on to coding activities! Remember to check all locations listed in Step 2 before proceeding!

## Coding Activities:

1. **Details for where to find activities:**
a) Now, you will code for model activities. Where information on activities exists on a website varies extensively. I would recommend going through each "Resources" subcategory in the database and move from left to right (starting from "traditional print media" and ending with "Minds-on & Immersive").

b) First, use your printed out table of key terms and look for the "resources" category on the left and the corresponding sub-category of interest to your current code. For example, let's say you are coding "Traditional Print Media", then look under the "Anchor Sample/Examples" column and the **relevant model key terms** to see examples of this type of resource. Model key terms are not sorted according to the resource sub-categories. So you must determine if the key term is relevant for the resource subcategory you are currently working on. You can see that "reports" are one of the examples.

c) You have 3 options for navigating a website to identify resources. Please see if option 1 is possible before attempting options 2 and 3.

Applies to all options:
When searching/identifying words associated with the anchor samples and model key terms, you may look for the exact word, the word in verb form, or synonyms of these words. Please prioritize searching/identifying the exact words first. Please also do a specific search using the word "participatory" and if it is found in association with any of the example terms, code under "P". You may also narrow your search by including terms associated with the target audiences. Scan as many pages as possible since sometimes activities are discussed on pages one wouldn't expect.

- Option 1: Search Function
  If the website has a search function within use this to search following the approach discussed in Step 1b and code accordingly. If you do not notice relevant information for coding within the first 4 or 5 search entrees, consider the current search complete, even if there are more entrees.

- Option 2: Command+F Search
  Use the "command+F" keyboard shortcut to search relevant pages for the resource anchor samples/examples and/or model key terms directly. If you use the command+F search, the search will only be completed on the current page. So, in this case, you will still need to identify relevant pages or tabs on the website. For identifying relevant pages, please see option 3.

- Option 3: Personal Discretion
  Please use your discretion in identifying what pages will be relevant. Having a solid understanding of the categories will help with identifying these tabs. For example, a website may have a tab on the home page called "projects" and under this tab there may be a sub-tab called "impact reports". This would be a logical place to look for reports. In contrast to this, the same website may have an "About" tab with a subtab called "Contact". This likely wouldn't be a logical place to look for reports. If you prefer to scan all content by reading it instead of using the command+F function, that is allowed. Note that this approach may take more time.

d) Make sure you exhaust searching all anchor samples/examples for a resource sub-category if you still have blank coding locations. Aka if there are particular model activity subcategories (D, X, P) or target audience subcategories (K-12, Teach, GP, N/A) that haven't been coded, make sure you strategically search for these using all anchor samples/examples.

e) In some cases, a website will have links that go to other websites. In this case, only code if the link **DOES NOT** take you to a different website. If you were to code this, you would essentially be coding a different practitioner's website, which we do not want. For example, in museums, often there are visiting exhibits on rotation and these exhibits are not necessarily created by that museum, therefore, they would not be coded.

2. **Details for coding activities:**
 a) Regarding what data you will use to code, you may use specific words, sentences, paragraphs, images, or videos from a website. Note that the content you code MUST be associated with a geoscience topic. If, for example, a website mentions having workshops but does not provide specific words or images indicating geoscience-specific offerings, then do not code. Note that this is different than how we coded for objectives where geoscience-related objectives were not necessary for coding. In cases with a picture/video **AND** associated text, code based on the text first. You can use a single sentence or phrase for more than one code. Please copy and paste the relevant portion of the sentence/phrase to the code of interest in the * column. Using the "#" symbol, please write the corresponding "term" you used to decide on the code. For example, if you decide that a website that says one of their activities is geoscience videos …" then you would quote this under the * column and put a #Use traditional means of mass media, at the end. Noting that "use traditional means of mass media" is one of the terms listed under the deficit model activities. In addition, please colour relevant components of the qualitative data in red.

b) You have been provided with a list of words/phrases associated with the deficit ("D" in the database), dialogue ("X" in the database), and participatory ("P" in the database) activities. This list can be found here. If you come across text that includes these exact phrases, individual words, or synonyms (as found in Thesauras.com) of these words, proceed to code. Please note that if the term "participatory" is used in front of any of the examples from the various "resources" subcategories, code under "P". If there is context on how a particular activity is used, use this context to code the activity a second time if the context is of a different model than the activity itself. Please see "Additional Rules/Tips for Coding" 3 for further clarification.

c) For the case of photos/videos or other digital media on a website, if the content matches the model terms, proceed to code. Once you have determined the target audience and resources sub-categories

relevant to the activity of interest (described in Step 4), you may code under the corresponding science communication model (D, X, or P). In the associated * column, please use a # and briefly describe what the photo or video shows.

d) Each model code can only be applied **once for every unique resource-audience-model combination**. As shown in [Figure 2](#) for example, you will notice the "Traditional Print Media" resource subcategory. This is one of nine resource sub-categories. All nine are not shown since the categories extend far to the right. Under the "Traditional Print Media" category you will see three audience sub-categories (K-12, Teach, GP). Details for these sub-categories can be found in the [Key Terms](#) section. Furthermore, each audience sub-category has three science communication model sub-categories (D, X, P). To summarize, there are 9 resource category levels, within each of these there are 4 audience category levels, and within each of these, there are 3 model category levels. Each model sub-category (*D, X, P*) can only be coded once for every unique resource-audience combination.

3. **Details for Coding Activities (Semantics):** In some cases, the phrases/words found in the *[terms](#)* section may not be the same as the text. In these cases, please use your judgment on which phrase most closely represents what the text says. A list of examples of semantics found on websites and related to the model activities has been provided for your convenience. If you still can't decide between two codes and there is an objective associated with the specific activity of interest, defer to coding based on the code you would apply to the objective.

4. **Details for Determining Corresponding Categories and Sub-Categories:**

i. Inherently in steps 1, 2, and 3, you are determining the sub-categories in which the codes will be applied.

ii. To be efficient with your time, make sure you are familiar with the deficit, dialogue, and participatory model activities' "[Terms](#)" and the definitions and examples of the various "[resource](#)" and "[audience](#)" subcategories. These will significantly assist you in 1) determining the relevant subcategories, and 2) determining what pages, tabs, and subtabs will be relevant to your coding.

iii. As mentioned in Step 1, strategically look for each resource subcategory and corresponding audiences in relevant pages on the website. In some cases, websites will include pages associated with a particular audience or a particular activity, in these cases, this automatically helps with determining the target **audience** and **resource**. In cases where a particular activity is associated with more than one target audience (such as in the example in step 5e below), please code under **BOTH** target audiences.

iv. For example, one common example of traditional print media is books. You will notice that "Use traditional means of mass media – print, TV, radio to engage" is one of "Terms" listed under deficit model activities. Books would be considered synonymous to print in this case. If you also look at the examples for the "traditional print media" subcategory, you will notice that "It includes newspapers, magazines, books, reports, statements and other written forms of media." Therefore, a book would be coded under the traditional print media category. If the book is noted to be intended for the general public, and youth, you would code under the "K-12" and the "GP" sub-categories. Since you found a relevant term in the deficit model activities code, you would then code as deficit model.

v.    You will notice that as you code more and more activities, you have less options for where to include a code. Use this to your advantage and restrict your searches for more activities based on what still can be coded.

vi.    There is an additional category called "Medium" and these sub-categories (science media, programs for science learning, and designed settings) may also help you in determining the appropriate resource category.

5.    **Details for Including Qualitative Data Associated with Codes:** If you include a code for an activity, you **MUST** then enter the associated qualitative data (words, sentences, images) that you used to make this decision under the * column directly to the right of the code you just entered. Please only paste directly from the website and use quotes.

    *Note: As you include data under the * column, the column will get larger. Feel free to adjust the width of the column to whatever size is most comfortable for you.

6.    Please re-read Step 1, especially 1e before continuing to the next step.

7.    Once you have checked all pages on a website for all possible deficit, dialogue, and participatory model activities within all combinations of unique target audiences and resources, included the code in the database, and included the relevant qualitative data, you are **DONE** coding activities for the website of interest, and can move on to your next assigned website to continue coding objectives and activities!

*Figure 2. Snapshot of database showing the Resources, Audience, and Science Communication Model Categories.*

## Additional Rules/Tips for Coding Activities

1) When coding museums, if coding based on exhibits displayed in the museum, only code based on those exhibits listed since Jan 2023

2) "Lesson plans" should be coded under "teacher" since this is a resource intended to assist them in classroom delivery, however, activities should be coded under "K-12 students"

3) In some cases, an activity may use terms associated with multiple models. For example, if a website has training videos; the training component of this activity could be considered as dialogue, while the video component could be considered deficit. It is important to prioritize the medium in which it is being communicated. In this case, the resource is still a video but since there is training associated with the video, it could be coded under science media, specifically traditional broadcast media, and then coded as dialogue model since the content involves training. In another example, let's look at an app used for collecting data, as part of a citizen science initiative. The app itself is a form of science media and would be coded as deficit. However, if there is context provided on how the app is used (in this case for collecting data) then you may also code this as science media – participatory. At this point, you have used this sentence for 2 codes at the resource category level and should no longer be able to code.

## Tips for Success

1) In some cases, words and text on websites may not be provided or may be vague BUT ALSO associated with a photo. If a photo is shown, and you interpret this to be the same or similar to a phrase or synonym of a phrase in the coding instructions, please code this.

2) When coding individual activities, I would recommend keeping a note of which model you identify the activity to be associated with somewhere convenient. As a reminder, when you identify that code, you will **NOT** be able to enter this into the database right away since you first must identify the corresponding *target audience* and *resources* category. Once these are determined, then you can enter the code. However, sometimes it may take a while to determine this, so you don't want to forget what model you were dealing with in the first place!

3) Please read and familiarize yourself with the exact definitions of these terms before coding.

4) I would recommend that you "freeze panes" in Excel to ensure you are entering codes for the correct website of interest (y-axis) and the correct sub-category (x-axis)

5) Note that the same sentence(s) can be used to code for 2 codes at each category levels. For example, consider the following sentence: "Our citizen science app is used to help teachers and students collect data." This sentence could be applied to a maximum of 4 codes. Two of these could be applied at the resource level (as in, new media – deficit, new media – dialogue) and 2 codes at the audience level (as in, teachers, K-12). However, you cannot use this to code under the supplementary resources category since that would exceed the maximum of 2 codes being applied at the resource category level.

Codes
1. Practitioner Goals

2. Practitioner Activities

# 1. Model Objectives

| Code: | 1 |
|---|---|
| Name: | Deficit |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) OR what you interpret as being synonymous based on the arrangement of words are included in |

the body of text under relevant pages (see "General Coding Instructions").

Terms: To: *"raise awareness", "transfer information, "educate", "correct misunderstandings or misperceptions", "promote or gain support for (geo)science/(geo)scientists", "promote or gain funding for (geo)science", "promote a particular (geo)scientific institution or organization", "promote (geo)science as a career", "inspire/excite, generate interest", "respond to people's interest in (geo)science", "address people's concerns about (geo)science", "increase trust in (geo)science and (geo)scientists", "influence people's attitudes", "influence people's behavior"*

*\*note that science/geoscience may or may not be used. Any terms associated with geoscience can be considered synonymous to science/geoscience for coding. These terms are included in the* [*"Key Terms"*](#)*.*

Other terms (newly added): **"provide a service"**

| Code: | 2 |
|---|---|
| **Name:** | **Dialogue** |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) OR what you interpret as being synonymous based on the arrangement of words are included in the body of text under relevant pages (see "General Coding Instructions"). |

**Terms**: To: *"be or to make science/scientists more accessible", "find out public opinion or about audience needs", "gain lay knowledge", "debate/discuss scientific/technological issues", "help people to make decisions", "make connections between people, including between disciplines"*

*\*note that science/geoscience may or may not be used. Any terms associated with geoscience can be considered synonymous to science/geoscience for coding. These terms are included in the* [*"Key Terms"*](#)*.*

| Code: | 3 |
|---|---|
| **Name:** | **Participatory** |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) OR what you interpret as being |

synonymous based on the arrangement of words are included in the body of text under relevant pages (see "General Coding Instructions").

**Terms**: To: *"To participate in a research endeavor with scientists", "get lay people involved in gathering data/doing research", "participate with other interests to influence the culture of science in society", "participate in democratic policymaking", "collectively learn", "reflect", "solve problems, "shape the agenda of science", "co-produce new knowledge/products", "critically reflect on science and its institutions"*

*\*note that science/geoscience may or may not be used. Any terms associated with geoscience can be considered synonymous to science/geoscience for coding. These terms are included in the "Key Terms".*

## 2. Model Activities

| Code: | 1 |
|---|---|
| **Name:** | **Deficit** |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) are included in the body of text under relevant pages (see instructions) code "1". <br><br> **Terms:** "Produce a publication", "Orally present science (one-way communication from someone/media to audience)", "Use traditional means of mass media – print, TV, radio to engage", "Provide an award to people", "Put up a display/exhibit, Have a promotional strategy/campaign", "Use formal educational means to engage", " Hold some type of event/show/meeting", "Compete for a prize". |

| Code: | 2 |
|---|---|
| **Name:** | **Dialogue** |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) are included in the body of text under relevant pages (see instructions) code "2". <br><br> **Terms:** *"*activity involving people in science", "provide access to scientists", "train/develop skills to participate in science", "workshops", "network", "discuss scientific issues", Bring together people from different disciplines or areas to work together", "research people's opinions and needs to better engage/communicate with" |

| Code: | 3 |
|---|---|
| **Name:** | Participatory |
| Instructions: | If any of the following terms OR SYNONYMS of these terms (according to thesaurus.com) are included in the body of text under relevant pages (see instructions) code "3".<br><br>**Terms:** *"participate with scientists in an activity", "collect data/do research", "jointly produce new knowledge", also if any of the following terms precede any of the examples from Table 2, "participatory", "co-created", "co-developed", or "co-constructed".* |