Creating and Sharing Digital Instructional Activities: A Practical Tutorial

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Abstract

BCBAs may encounter situations, such as the current COVID-19 pandemic, that preclude them from providing traditional in-person ABA services to clients. When conditions prevent BCBAs and behavior technicians from working directly with clients, digital instructional activities designed by BCBAs and delivered via a computer or tablet may be a viable substitute. Google applications, including Google Slides, Google Forms, and Google Classroom, can be particularly useful for creating and sharing digital instructional activities. In the current paper, we provide task analyses for utilizing basic Google Slides functions, developing independent instructional activities, developing caregiver-supported instructional activities, and sharing activities with clients and caregivers. We also provide practical recommendations for implementing digital instructional activities with clients and caregivers.

Keywords: autism, technology-based learning, telehealth

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Editor's Note

Introduction

Applied behavior analytic (ABA) skill acquisition services are typically delivered in-person, through clinic- and home-based models. Regardless of setting, a trained behavior therapist, under the supervision of a Board Certified Behavior Analyst (BCBA), typically interacts directly with clients to implement skill acquisition programming using a variety of evidence-based instructional strategies, such as Discrete Trial Instruction (DTI; Lovaas, 1981) or naturalistic instruction techniques (e.g., Charlop-Christy et al., 1999). These instructional strategies have been demonstrated to be effective, but some situations, such as the current COVID-19 global pandemic, may cause service disruptions. Unfortunately, many individuals who receive ABA services may struggle to maintain skills when long gaps without services occur (Lotfizadeh et al., 2020). Given that ABA-based treatments have been deemed medically necessary, it will be important for service providers to work with clients and families to provide appropriate alternative instructional activities, when it is not feasible to conduct traditional in-person treatment.

Recently, researchers have investigated the efficacy of using telehealth to provide behavior analytic services from a distance. Previously, telehealth models of service delivery have been used in situations where there are geographic barriers to conducting in-person treatment (Eid et al., 2017; Fisher et al., 2014; Suess et al., 2014). Prior researchers have demonstrated the efficacy of using telecommunication technology to train caregivers to assess and treat problem behavior (Suess et al., 2014) and implement skill acquisition programming using DTT (Eid et al., 2017).

Although research indicates that caregivers can be effective implementers, it may be challenging for them to develop material that can be utilized during instructional programming. Moreover, digital instructional activities can have embedded schedules to provide structure for how and when instructional material is presented to the learner. One alternative may be to develop and disseminate digital instructional activities that parents can implement with their children. There are several advantages to creating and sharing digital instructional content, particularly during the COVID-19 global pandemic. First, digital content can be easily developed, edited, and re-arranged by the BCBA. This may alleviate some of the burden on caregivers to locate, organize, and arrange instructional materials and activities. Second, digital platforms provide BCBAs with the unique opportunity to program feedback into instructional activities. This digital feedback may allow clients to engage with the instructional programming with less prompting and support, which may be particularly valuable during the current crisis, as caregivers may be balancing work and homeschooling responsibilities for other children in the home. Finally, caregivers may be able to use digital instructional content even beyond the current COVID-19 crisis to supplement traditional instruction and mitigate in-person service

interruptions that may occur due to unforeseen circumstances such as changes in geographic location, illness, or injury.

        In traditional in-person intervention, common instructional programs for children with autism spectrum disorder (ASD) and related disorders are created to increase both listener and speaker responding through instructor-led learning trials in the home or clinic. We have found that Google applications, such as Google Slides (Google LLC, 2006) and Google Forms (Google LLC, 2008), can be particularly useful for creating digital versions of these types of instructional programs with which learners can interact, either independently, or with the support of a caregiver, given their universal availability and functionality across multiple devices and operating systems. BCBAs can use Google Slides to create a variety of activities in which a learner receptively identifies stimuli from an array (e.g., colors, shapes, numbers, letters, objects, etc.) or identifies parts of a single image (e.g., body parts, prepositions, etc.). Using the Google Slides application, BCBAs can make interactive programs that learners can complete independently by incorporating praise, prompting, and error correction into the digital instructional content that is delivered automatically as the learner interacts with the activity. It may also be useful to provide clients and families with caregiver-supported digital instructional content, which can be implemented by a caregiver with remote support from a BCBA. BCBAs can use Google Slides and Google Forms to create and organize many different caregiver-supported instructional activities such as imitation, letter matching, sequencing, and expressive identification activities (e.g., identifying objects, answering personal information questions, answering wh-questions, etc.).

        After creating instructional content, BCBAs will also need an easy way to organize and share learning activities with clients and families. Google Drive and Google Classroom

applications are potential solutions as they allow users to conveniently organize and share

content with other users. BCBAs can use Google Drive as a simple application to organize and

share specific files, folders, and activities. Google Classroom—albeit a more complex solution to

information and activity sharing—is another promising application for sharing behavior analytic

instructional activities with clients and families that has a number of additional features that

make it an attractive option for organizing instructional activities and sharing with clients and

caregivers. Google Classroom introduced in the Google Apps for Education in 2014

(Shaharanee, Jamil, & Rodzi, 2016), allows teachers and clinicians to provide instruction, create

assignments, and communicate with students through a digital platform (DiCicco, 2016).

Although research on the effects of Google Classroom instruction is limited, there have been

some early positive results. DiCicco found that 7th grade social studies students with learning

disabilities increased vocabulary scores after using direct instruction through Google Classroom.

Students also reported high levels of satisfaction related to using the Google Classroom platform

(DiCicco).

There are several practical advantages to using Google applications to create and share

instructional activities. First, all Google applications, including Google Slides and Google

Forms, can be seamlessly integrated into a Google Classroom. Second, Google applications are

free and available on virtually all digital devices, making them a convenient technology platform

for clients and families to access. Third, Google applications are used across many schools and

work places; so, it is possible that some clients and caregivers have experience using similar

programs.

In this article, we aim to provide a practical tutorial for using Google applications to

develop and disseminate behavior analytic digital instructional activities. We will discuss and

provide task analyses for the following: (a) utilizing basic functions within Google Slides (e.g., adding shapes, inserting images, linking stimuli, and protecting slides) to create interactive instructional materials (b) developing independent instructional activities that learners can complete with minimal caregiver support (c) developing caregiver-supported instructional activities where the caregiver provides instruction using digital learning materials, and (d) organizing materials and sharing activities with clients and caregivers using Google Classroom.

Basic Google Slides Functions

BCBAs can create a variety of instructional activities using Google Slides such as color identification, object identification, and activities that teach prepositions. One distinct advantage to using Google Slides is the ability to link learner responses to praise and error correction slides so that the learner automatically receives feedback appropriate to the response emitted. For example, consider a learner who is working on a color identification activity. The BCBA who develops the activity can arrange the slides so if the instruction is "Touch red" and the learner touches red, the Google Slides presentation will automatically navigate them to a praise slide. If the learner touches green, the Google Slides presentation will automatically navigate them to an error correction slide. These types of activities are valuable for caregivers because it reduces some of the burden of prompting and error correction.

In order to create the interactive digital content described above, developers need to use several Google Slides functions. The following section includes task analyses that review the basic Google Slides component skills BCBAs will use to create instructional activities using the task analyses in subsequent sections. These component skills include: (a) building a Google Slides presentation, (b) adding visual stimuli (e.g., shapes, images, and text boxes), (c) adding

auditory stimuli, (d) adding links to stimuli, (e) adding navigation arrows, and (f) protecting the slide.

Building a Google Slides Presentation:

1. Open a web browser and sign into a Google account.

2. Navigate to http://docs.google.com/presentation.

3. Create a new blank presentation by clicking the multicolored plus sign in the navigation bar near the top of the page.

4. Create a title slide with the name of the instructional activity.

5. Create a new blank page by clicking on the last page in the left column and pressing the "Enter" key.

6. Add desired content.

7. Preview slides by selecting "Present" at the top right of the screen (Fig. 1).
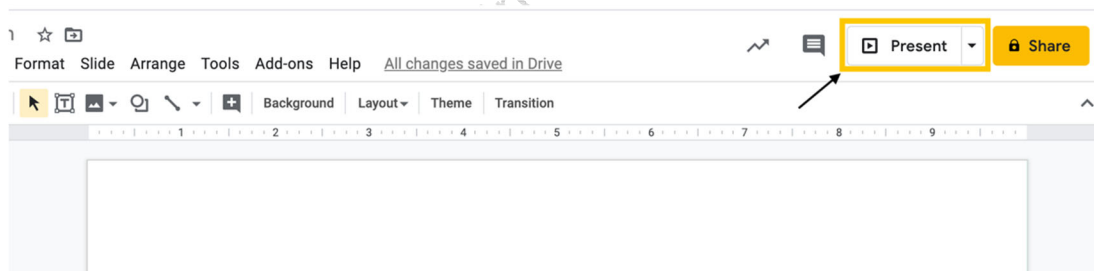
Fig. 1 Google Slides "Present" view

Adding Visual Stimuli

   BCBAs can create instructional stimuli by adding visual stimuli (e.g., shapes, images, and text boxes) to a Google Slides presentation.

Adding Shapes:

1. Select the "Shape" icon on the toolbar (Fig. 2).

2. Select a specific shape. (Fig. 2).
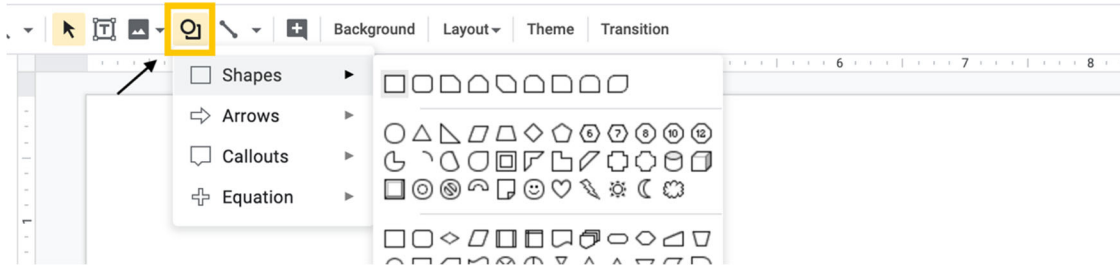
Fig. 2 Shape menu

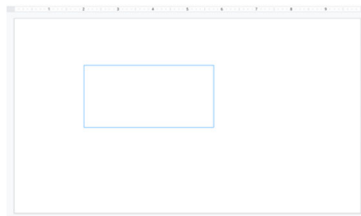3. Click anywhere on the slide and drag the cursor to size the shape (Fig. 3).

Fig. 3 Sizing the shape

a. Holding the "shift" key while dragging the cursor will keep the shape square.

Doing so will make a perfect square, circle, or equilateral triangle (Fig. 4).
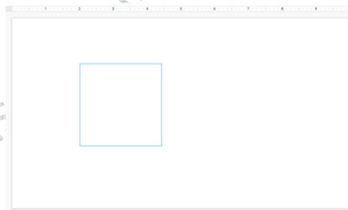

Fig. 4 Sizing the shape using the "Shift" key

4. To change the color of the shape:

a. Select the shape.

b. As shown in Fig. 5, select the "Fill color" icon on the toolbar and select a specific

color.
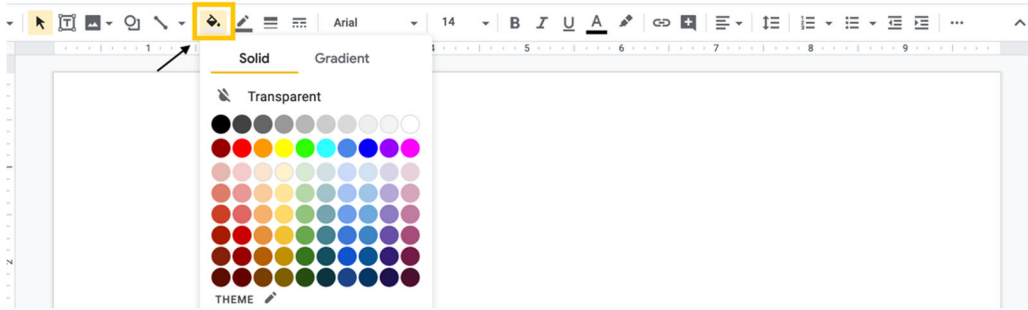
Fig. 5 Fill color icon

c.   As shown in Fig. 6, select the "Border color" icon on the toolbar and select
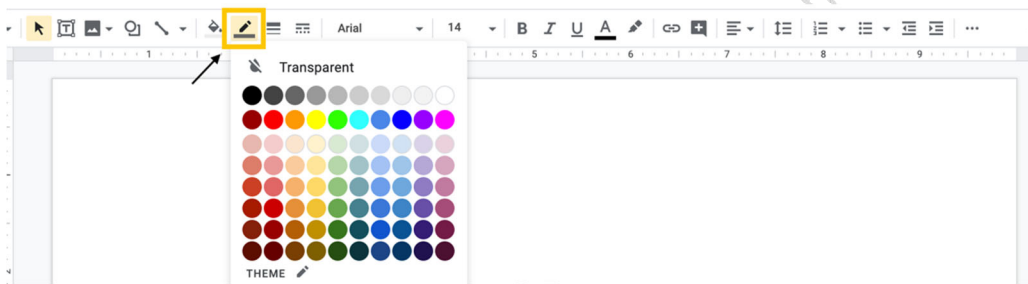
"transparent" or a specific color for the border.

Fig. 6 Border color icon

Inserting Images:

1.   As shown in Fig. 7, select the "Insert image" icon on the toolbar and select an option for
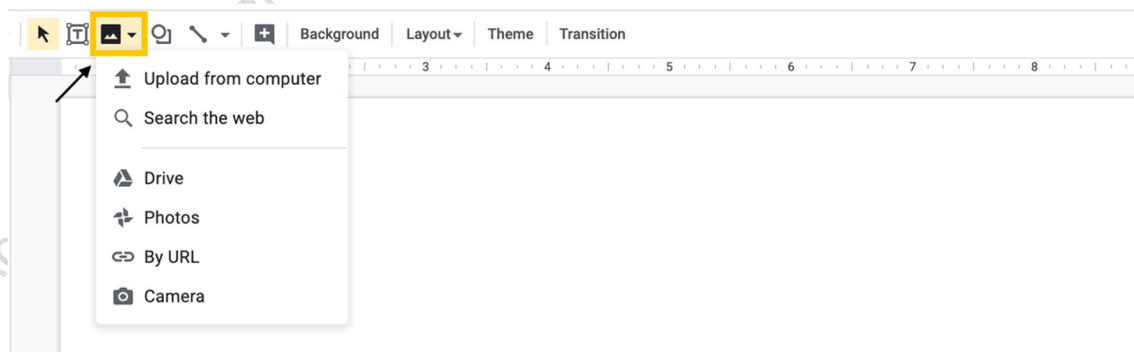
inserting the image.

Fig. 7 Insert image icon

a. To insert an image using the "Upload from computer" option, navigate the menu where the image is saved, select the image, and select "open".

b. To insert an image using the "Search the web" option, enter an image type into the search box, select an image, and click "INSERT" (Fig. 8).
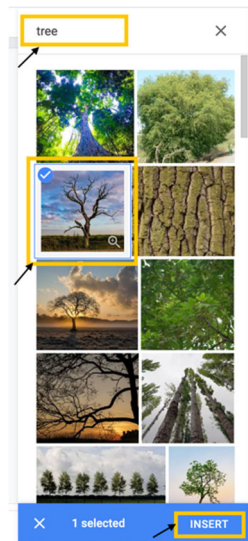

Fig. 8 Inserting an image using the "search the web" option

c. To insert an image using the "Drive" or "Photos" options, select an image from Google Drive or Google Photos and select "INSERT".

d. To insert an image using the "By URL" option, right click an image from the internet. Select "copy image address" (Fig. 9), select the "By URL" option, paste it into the field (Fig. 10), then select "INSERT".
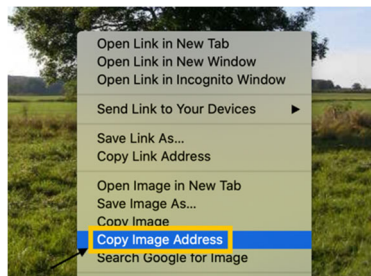

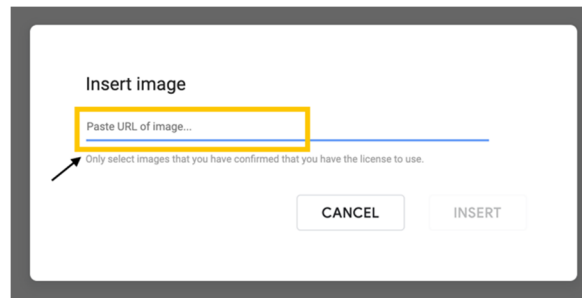**Fig. 9** Copying the image address

Fig. 10 Pasting the image URL

Adding Text Boxes:

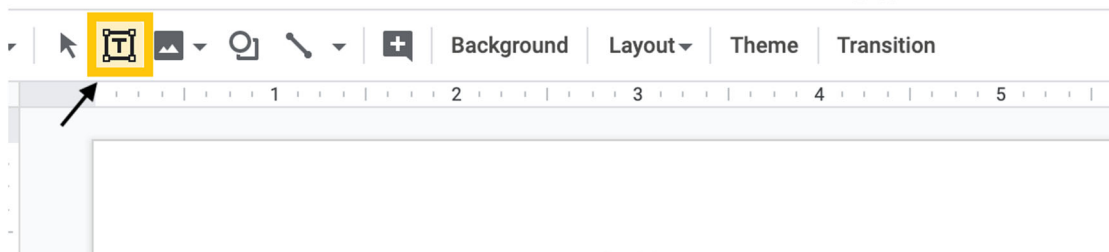1. As shown in Fig. 11, select the "Text box" icon on the toolbar.

Fig. 11 Text box icon

2. Add the text box to the slide by clicking a specific location. Drag with the cursor until the text box is the desired size.

Adding Auditory Stimuli

Google Slides allows users to add audio file content to slides. With this feature, BCBAs can add vocal instructions, praise, and other vocalizations. Adding auditory stimuli into slides can make activities more accessible to clients who cannot read. There are a variety of tools for recording audio files including QuickTime Player (Apple, 2016), Voice Recorder (Microsoft Corporation, 2013), and Online Voice Recorder (https://online-voice-recorder.com/; 123apps LLC, 2012). Audio files need to be saved as mp3 files in a folder in Google Drive (see "Creating and Sharing a Folder").

Inserting Audio Files:

1. As shown in Fig. 12, select "Insert" on the title bar and select "Audio".
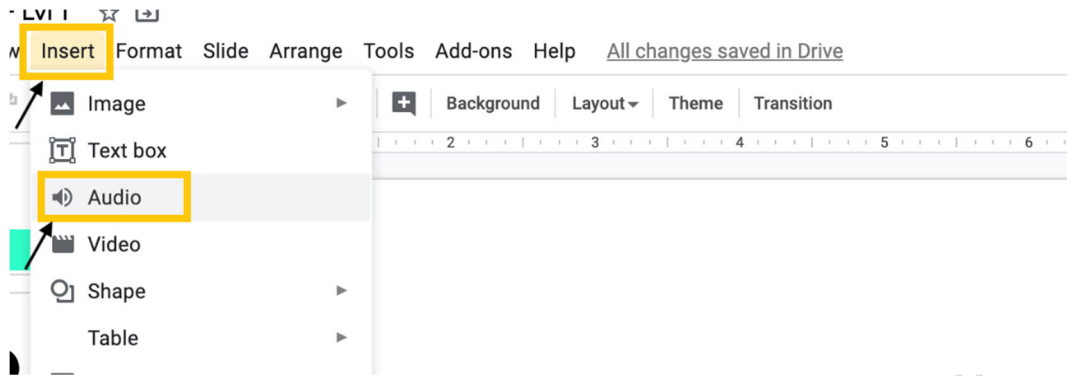

Fig. 12 Inserting audio

2. Navigate the menu to find the audio file in Google Drive.

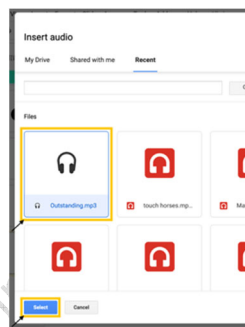3. Select the "audio file" (Fig. 13) and click "Select".

Fig. 13 Selecting an audio file

4. Move the audio file to the upper right corner of the slide (Fig. 11).
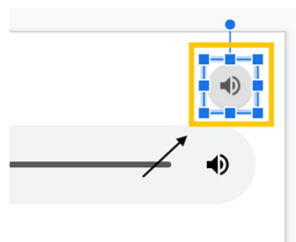

Fig. 14 Placing the audio file on the slide

5. Select "audio file" to change settings.

    a. Under "Start playing" select "Automatically" so the audio starts without clicking on anything (Fig. 15).

    b. Check "Hide icon while presenting" so the icon is not visible or distracting to the learner (Fig. 15).
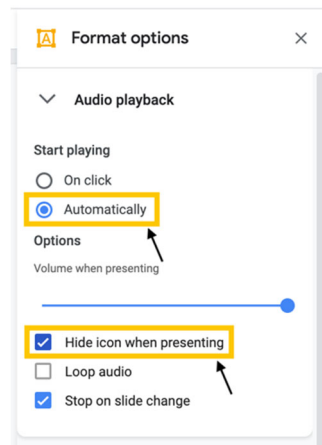

Fig. 15 Changing audio file settings

6. Select "Present" (Fig. 1) to verify that the audio plays automatically and the icon is hidden on each slide.

    a. If a slide does not play the audio automatically, return to step 5a.

    b. If the icon is still visible, return to step 5b.

Adding Links to Stimuli

BCBAs can create an interactive experience for the learner by adding links to stimuli. Linked stimuli can automatically navigate learners to a praise slide, error correction slide, back to the original instruction slide, or to subsequent instruction slides within the activity, depending on the learner's response.

Adding Links:

1. Select the "shape/image" to add a link to.

2. As shown in Fig. 16, select "Insert link" on the toolbar. If the "Insert link" icon is not
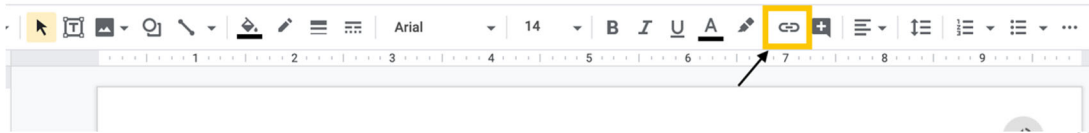
    visible, try closing the side bars.

Fig. 16 Insert link icon

3. Select the "Slides in this presentation" option (Fig. 17).
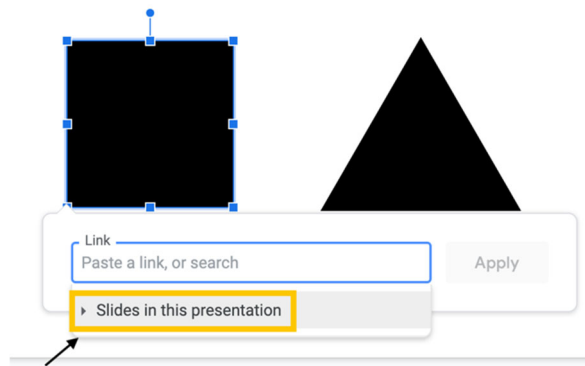

Fig. 17 Insert link menu

4. Select which slide the shape/image should navigate to (i.e., praise slide or error correction

    slide).

5. Select "Apply" so the shape/image will navigate to the correct slide (Fig. 18).
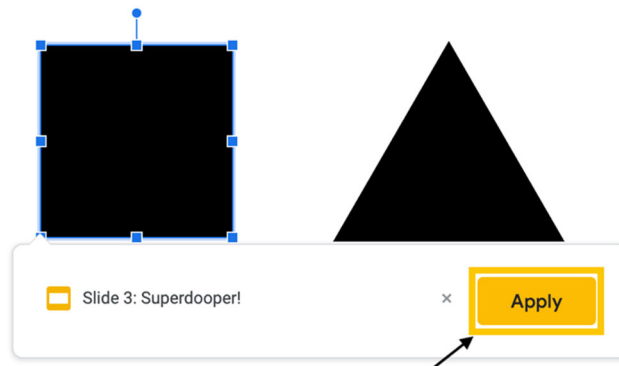
Fig. 18 Inserting the link

6. To ensure that the shape/image is connected to a link, select the shape/image and check

for the white link bar below the shape/image (Fig. 19). If the shape/image is not linked or

linked to the wrong slide, select "Remove link" and return to steps 1-5.
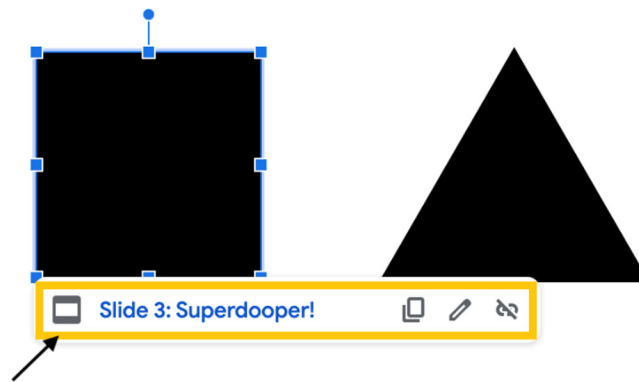

Fig. 19 Verifying that the shape/image is linked

Navigation Arrows

Navigation arrows allow the learner to easily navigate across the different slides within

the instructional activity.

Adding Navigation Arrows:

1. Select the "Shape" icon and select "Right Arrow" (Fig. 20). Draw in the bottom right
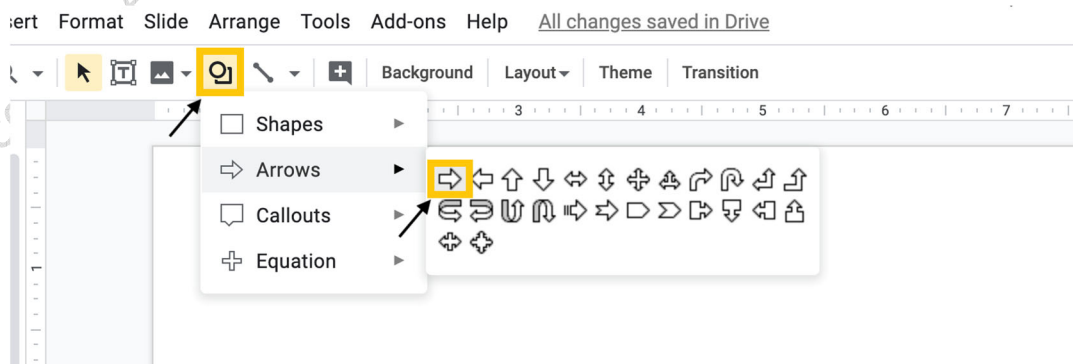
corner of the page.

Fig. 20 Shape tool menu

2. Double click on the arrow and type NEXT in the center of the arrow. Resize and center as shown in Fig. 21.

Fig. 21 Navigation arrow

3. Repeat steps 1-2 to create a left arrow that says GO BACK.

4. Place the "NEXT" arrow in the bottom right corner and "GO BACK" in the bottom left corner (Fig. 22).
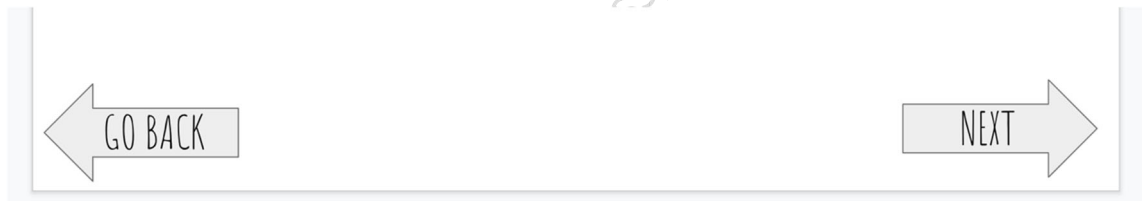

Fig. 22 Navigation arrows

5. As shown in Fig. 23, link the arrows to navigate the learner to the appropriate slide (see "Adding Links"). Select the shape and not the font when creating the link.
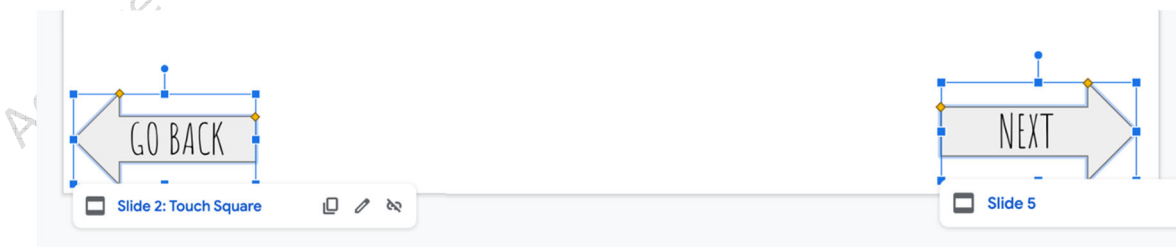

Fig. 23 Linked navigation arrows

6. Select "Present" (Fig. 1) and use the navigation arrows to progress through the slides.

a. If a navigation arrow does not work correctly, check the link for that arrow by selecting the arrow and checking the white link bar below it (Fig. 23).

i. If the arrow is not linked or linked to the wrong slide, select "Remove link" and follow steps 1-5 of "Adding Links".

Protecting the Slide

Once all stimuli and links have been added, the BCBA needs to add a final protective film to the slide to prevent the learner from moving to the next slide without clicking on a linked stimulus.

Adding a Protective Film:

1. As shown in Fig. 24, insert a rectangle that covers the entire slide (see "Adding Shapes"). Typically, the rectangle will have a fill color. It's fine to leave the fill color for now. It will be adjusted later. This rectangle will be the protective film.
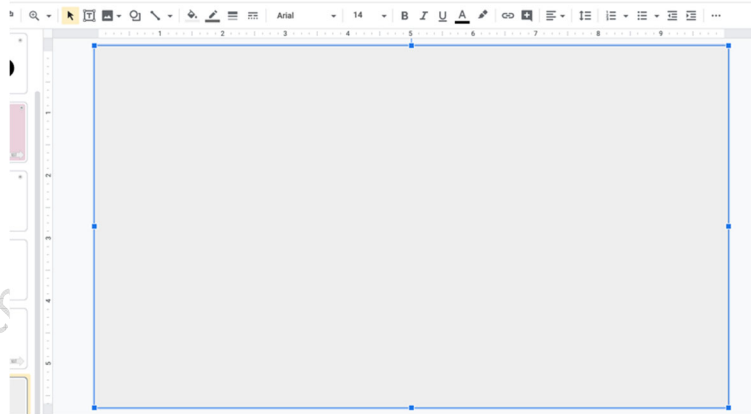
Fig. 24 Inserting the protective film shape

2. Select the protective film and link it to the current slide (see "Adding Links"). This will prevent any clicks from transitioning to another slide.

3. As shown in Fig. 25, right click the protective film, navigate to "Order", and select "Send to back".

Fig. 25 Order menu

4. Select any non-linked stimuli (e.g., instruction text box) and "Send to back" as well so the only stimuli in front of the protective film are linked stimuli (Fig. 26; e.g., instructional stimuli, arrows). This will disable all clicks or presses anywhere on the page other than clicking or touching the stimuli.
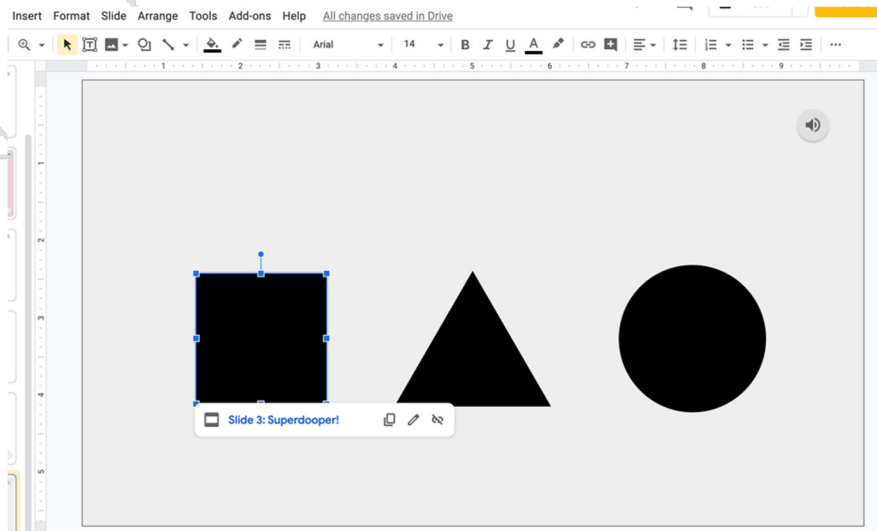
Fig. 26 Only linked stimuli in front of protective film

5. For finishing touches, select the protective film and change "Fill color" (Fig. 27) and

    "Border color" (Fig. 28) to transparent.
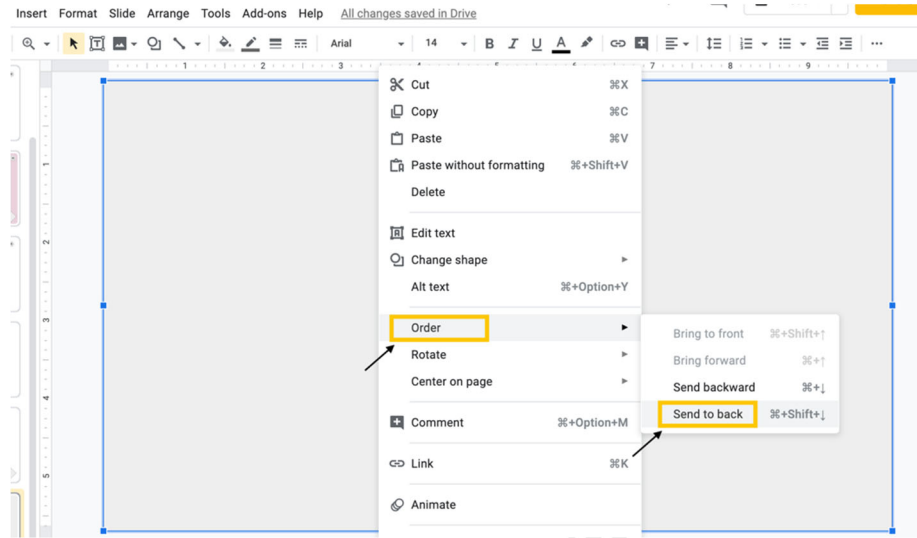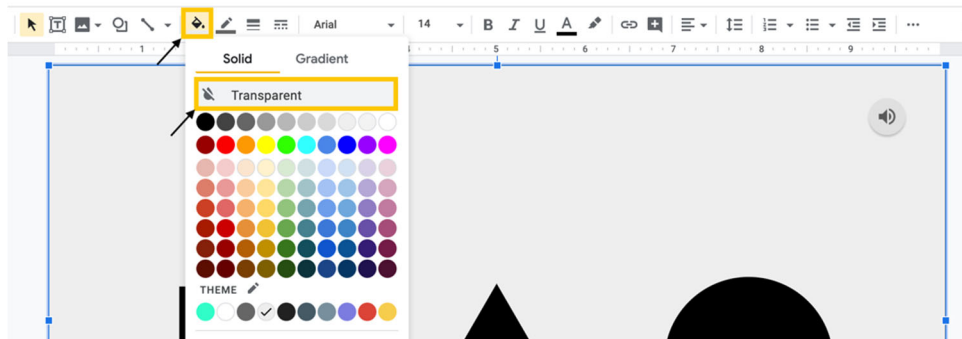

Fig. 27 Fill color tool menu; transparent option selected
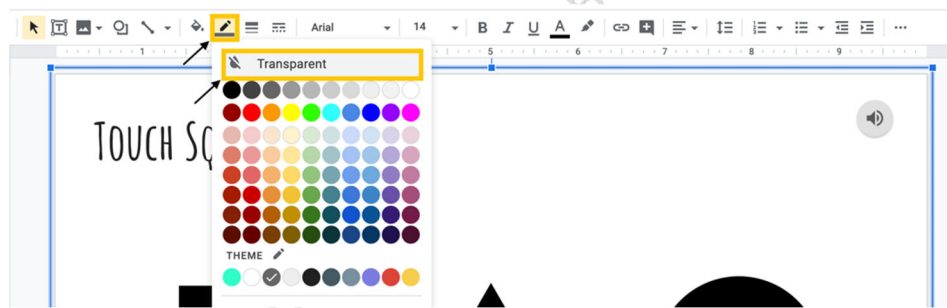
Fig. 28 Border color tool menu; transparent option selected

6. Now the only selection options on the instructional slides should be the target response

    and distractor responses that will navigate the learner to the corresponding feedback. For

    praise and error correction slides (depending on the prompting strategy used), the

    navigation arrows should be the only selection options. To ensure that everything works

    as it should, use the "Present" feature (see Fig. 1) and attempt to click on areas of the

    slide that are not linked stimuli or navigation arrows.

a. If the slide progresses to the next slide without selecting a linked stimuli or navigation arrow, ensure that the protective film is correctly linked by checking the white link bar below it.

    i. If the protective film is not linked or linked to a slide other than the current slide, select "Remove link" and follow steps 1-5 of "Adding Links" to link the protective film to the current slide.

Creating Independent Instructional Activities

To develop independent activities, BCBAs can program praise, prompting, and error correction into the digital instructional activity (See Appendix A). Digital activities that are designed to be completed by learners with minimal caregiver support could involve the learner either selecting a correct target response from an array of stimuli or selecting part(s) of a stationary picture. We have provided task analyses for both types of activities below.

Selecting from an Array

In this type of activity, the learner selects one picture from an array. Specific examples of instructional activities in which the learner responds by selecting from an array include receptive color, shape, object, and letter identification activities.

Creating an Array of 3:

1. Open a new presentation in Google Slides.
2. Create a title slide.
3. Create three blank slides for the first target response (instruction, praise, and error correction slides). When adding the links (in a future step), it may be helpful to title these three slides accordingly (1-instruction, 2-praise, and 3-error correction).

4. Add the instruction for the target to the first instruction slide in the slide title area or by adding a text box (see "Adding Text Boxes").

5. Delete extra text boxes on the slide.

6. Insert the target stimulus and two distractor stimuli (see "Adding Shapes" and "Adding Images").

7. As shown in Fig. 29, use the guide bars to line up the three stimuli in a row.
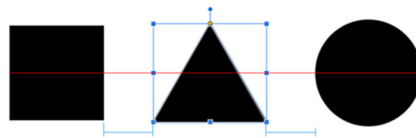
Fig. 29 Lining up visual stimuli

8. Add a link for the correct stimulus to navigate the learner to a praise slide (see "Adding Links").

9. Add links for the distractor stimuli to navigate the learner to the error correction slide (see "Adding Links").

10. Add a vocal instruction to the slide (see "Inserting Audio Files").

11. Add the protective film to the slide (see "Adding a Protective Film").

12. Navigate to the praise slide and add content (see "Practice Recommendations" below). A few options include:

    a. Textual praise statements (see "Adding Text Boxes").

    b. Auditory praise statements (see "Inserting Audio Files").

    c. Pictures (see "Inserting images").

13. Add a navigation arrow to advance to the next instructional slide (see "Adding

Navigation Arrows").

14. Add the protective film to the praise slide (see "Adding a Protective Film").

15. Navigate to the error correction slide and add content (see "Practice Recommendations"

below). A few options include:

 a. Textual error correction statements (see "Adding Text Boxes").

 b. Auditory error correction statements (see "Inserting Audio Files").

 c. Pictures (see "Inserting images").

 d. Prompts (see "Practice Recommendations" below).

 e. Add a navigation arrow to either go back to the previous instructional slide or link

   the stimulus (see "Adding Navigation Arrows").

16. Add the protective film to the error correction slide (see "Adding a Protective Film").

17. Repeat steps 2-15 to build the remainder of the instructional activity.

18. Double check that everything is working as it should by using the "Present" feature (Fig.

1).

 a. If audio does not begin playing automatically or the icon is visible, refer to the

   troubleshooting tips in step 6 of the "Inserting Audio Files".

 b. If stimuli are not navigating to the correct slides, refer to the troubleshooting tips

   in step 6 of "Adding Links".

 c. If navigation arrows are not navigating to the correct slides, refer to the

   troubleshooting tips in step 6 of "Adding Navigation Arrows".

   d. If slides are progressing by clicking anywhere on the slide that is not a linked

     stimulus or navigation arrow, refer to the troubleshooting tips in step 6 of

     "Adding a Protective Film".

Selecting Parts of a Picture

   In this type of activity, the learner selects part of a stationary picture. Specific examples

of instructional activities in which the learner responds by selecting part of a stationary picture

include receptive body part identification and preposition activities.

Creating a Stationary Background:

1. Open a new presentation in Google Slides.

2. Create a title slide.

3. Create three blank slides for the first target response (instruction, praise, and error

  correction slides). When adding the links (in a future step), it may be helpful to title these

  three slides accordingly (1-instruction, 2-praise, and 3-error correction).

4. Paste or insert the image to the instruction slide (see "Adding Images").

5. Adjust the placement and size of the picture to the desired fit on the slide.

6. Select "File" from the title menu, select "Download," and select "PNG image (.png,

  current slide)." This will create a downloaded picture of the slide (Fig. 30).
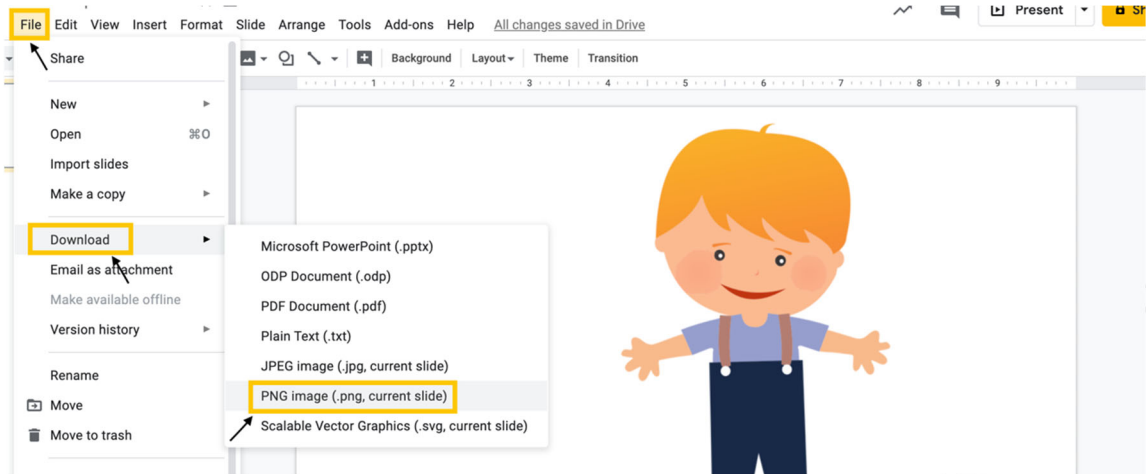
Fig. 30 Saving the current slide as an image

7. A "Save Page" may appear or it may automatically download.

    a. If given the option to save, title .png file, select the desired location, and click "save."

8. Delete the slide and create a blank slide in its place. Select the "Background" option from the toolbar (Fig. 31).
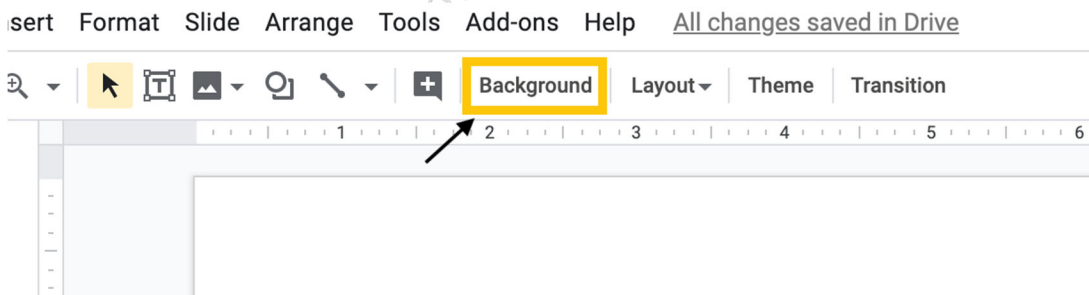
Fig. 31 Background option

9. As shown in Fig. 32, select "Choose image" from the background menu.
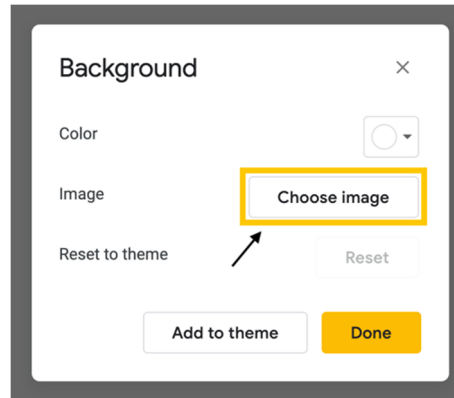
Fig. 32 Background menu

10. Select the image for the background by navigating the "BROWSE" menu or dragging the downloaded .png image file to the "drag a file here" location.

11. As seen in Fig. 33, the image should now appear on the slide. Select "Done" on the background menu.

Fig. 33 New stationary background

12. The image should now be a part of the slide background.

Once the stationary background is created, it can be turned into an interactive activity by adding shapes that are linked to praise and/or error correction slides.

Creating Interactive Activities with a Stationary Background:

1. Add a textual stimulus for the current target (e.g., "Touch Head"; see "Adding Text Boxes").

2. Add an auditory stimulus for the current target (e.g., "Touch Head"; see "Inserting Audio Files").

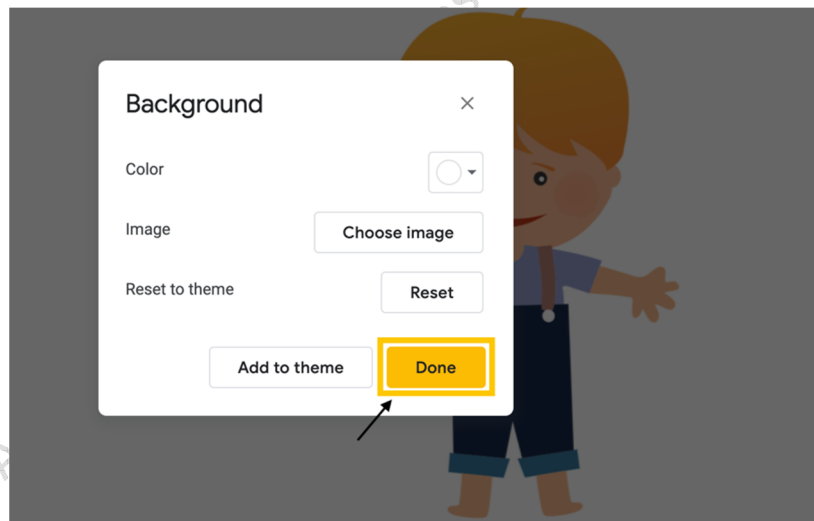3. Insert a shape that is appropriate for the section of the stationary image that is considered the correct response. (see "Adding Shapes").

4. As shown in Fig. 34, place the shape on top of the area of the stationary picture that is the target response. For this example, a circle was added around the "head" portion of the stationary background.
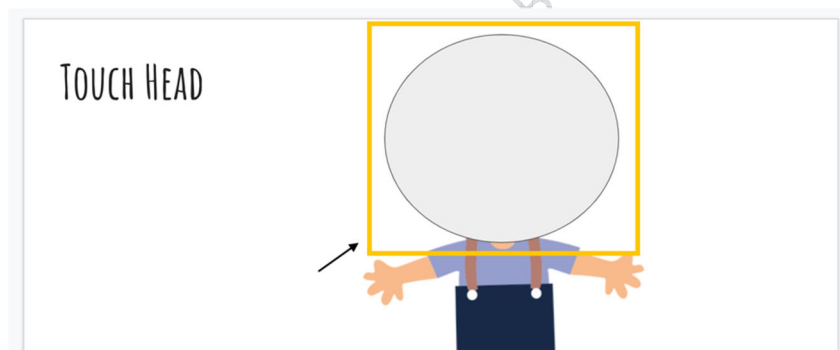
Fig. 34 Shape covering target response

5. Add a link to the shape that will navigate the learner to the praise slide (see "Adding Links").

6. Add the protective film to the slide, leaving only the target response shape above the film (see "Adding a Protective Film"). Please note that the protective film in this activity/program should be linked to the error correction page. In this manner, any selection outside of "head" will be considered an incorrect response.

7. Make the fill color (Fig. 27) and border color (Fig. 28) of the shape covering the target response transparent.

8. Add in praise and error correction slides.

9. Double check that everything is working as it should by using the "Present" feature (Fig. 1).

   a. If audio does not begin playing automatically or the icon is visible, refer to the troubleshooting tips in step 6 of "Inserting Audio Files".

   b. If stimuli are not navigating to the correct slides, refer to the troubleshooting tips in step 6 of "Adding Links".

   c. If navigation arrows are not navigating to the correct slides, refer to the troubleshooting tips in step 6 of "Adding Navigation Arrows".

   d. If slides are progressing by clicking anywhere on the slide that is not a linked stimuli or navigation arrow, refer to the troubleshooting tips in step 6 of "Adding a Protective Film".

Creating Caregiver-Supported Instructional Activities

In order to complete caregiver-supported instructional activities, the learner will need support from a caregiver who will facilitate the instructional activity and provide praise and error correction (if necessary) following learner responses. There are multiple ways to develop caregiver-supported instructional activities. BCBAs can (a) use basic Google Slides functions to arrange instructional content into a Google Slides presentation (see "Basic Google Slides Functions" section above), (b) use Google Slides to develop activities where learners drag and drop stimuli on a slide (approximating activities in which learners manipulate stimuli such as sorting, matching, patterning, or sequencing activities), or (c) arrange instructional content into a

Google Form. We have included task analyses for developing drag and drop activities and arranging instructional content into a Google Form below.

Dragging and Dropping Stimuli

In this type of activity, the learner drags items to a specific location on the slide and a caregiver provides feedback on responses. Specific examples of drag and drop instructional activities include letter matching, sequencing, patterning, and sorting activities.

Creating Drag and Drop Activities:

1. Open a new presentation in Google Slides.

2. Create the stationary components for the drag and drop activity. The following example will provide instructions for creating a letter matching activity. These steps can be used to create a variety of drag and drop activities.

    a. Insert a text box (see "Adding Text Boxes") and type the instructions (Fig. 35).
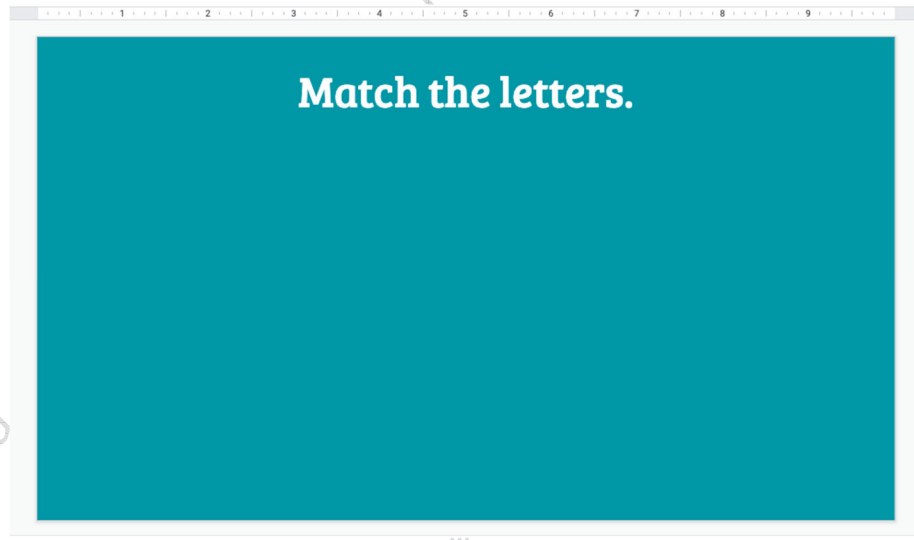

Fig. 35 Instructions on blank slide

    b. Insert the desired shape (see "Adding Shapes"; Fig. 36).

Fig. 36 Inserting the shape

   c. Add additional stimuli as needed for the instructional activity (see "Adding

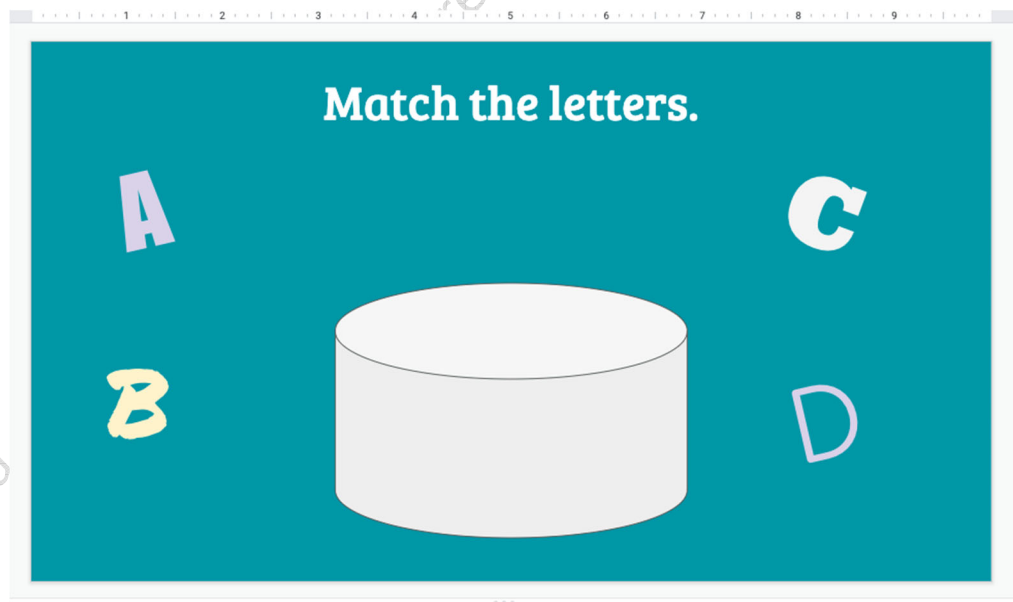   Shapes" and "Inserting Pictures"; Fig. 37).

Fig. 37 Adding additional stimuli

  3. Create a stationary background (see "Creating a Stationary Background").

4. As shown in Fig. 38, insert mobile objects with individual text boxes (see "Adding Text

   Boxes") and/or shapes (see "Adding Shapes"). Do not add letters in the text boxes.

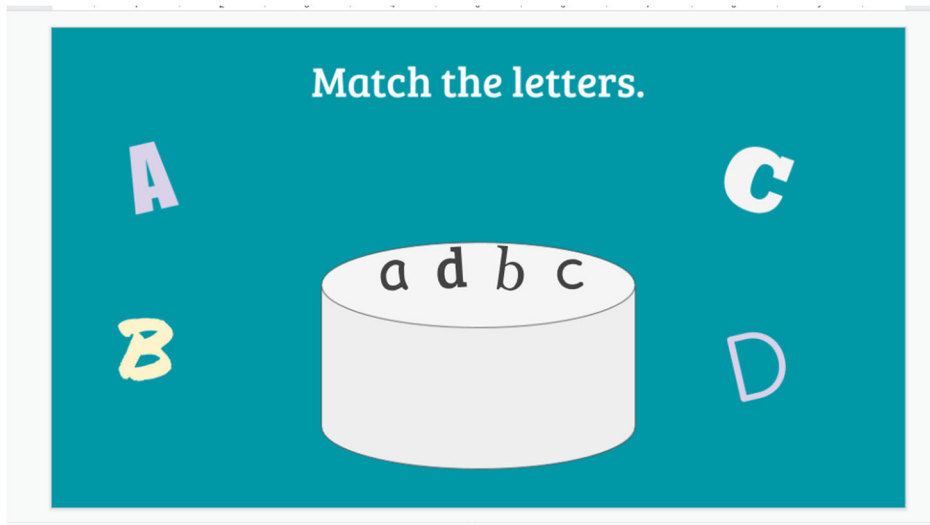   Mobile objects need to be text boxes with shapes or pictures.

Fig. 38 Adding mobile objects

5. Share the activity with clients by selecting the "Share" button and entering the client's

   email (Fig. 39). Clients can interact with activity in the slide and the caregiver can

   provide feedback. Please note that slides are NOT mobile in "Present" mode.

Fig. 39 Sharing the drag and drop activity

Google Forms

In this type of activity, the caregiver presents the question listed in the Google Form, the

learner responds, and the caregiver provides feedback and marks whether the learner answered

correctly or incorrectly. Specific examples of instructional activities BCBAs can arrange in a

Google Form include non-verbal imitation, speaker responding (e.g., shapes, colors, objects,

letters, etc.), and personal information question activities.

Creating a Google Form:

1. Navigate to Google Forms by entering https://www.google.com/forms/about/ into a web

   browser.

2. Click on "Go to Google Forms" (see Fig. 40).
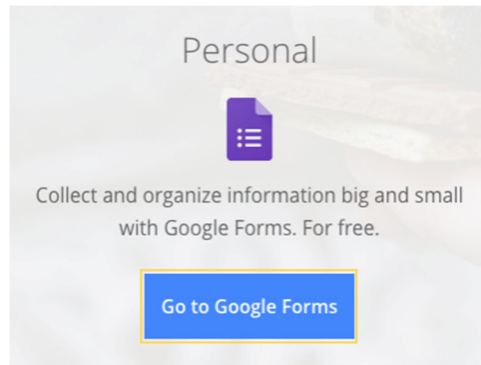
Fig. 40 Navigate to Google Forms

3. Click the Blank "+" sign as shown in Fig. 41.
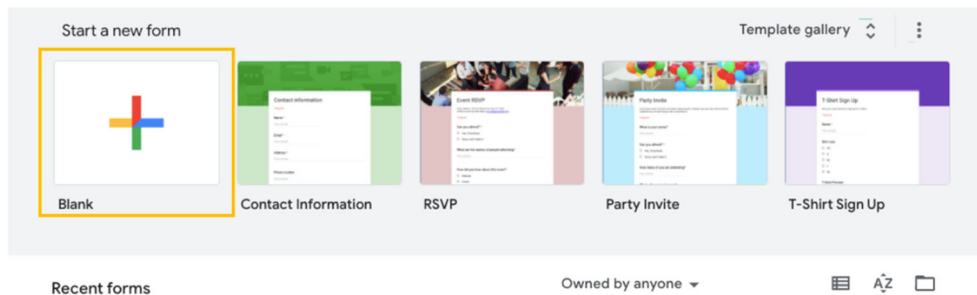
Fig. 41 Start a new blank quiz

4. As shown in Figure 42, click on "Untitled form" in the upper left-hand corner of the

   screen and enter the title of the instructional activity (e.g., Personal Information).
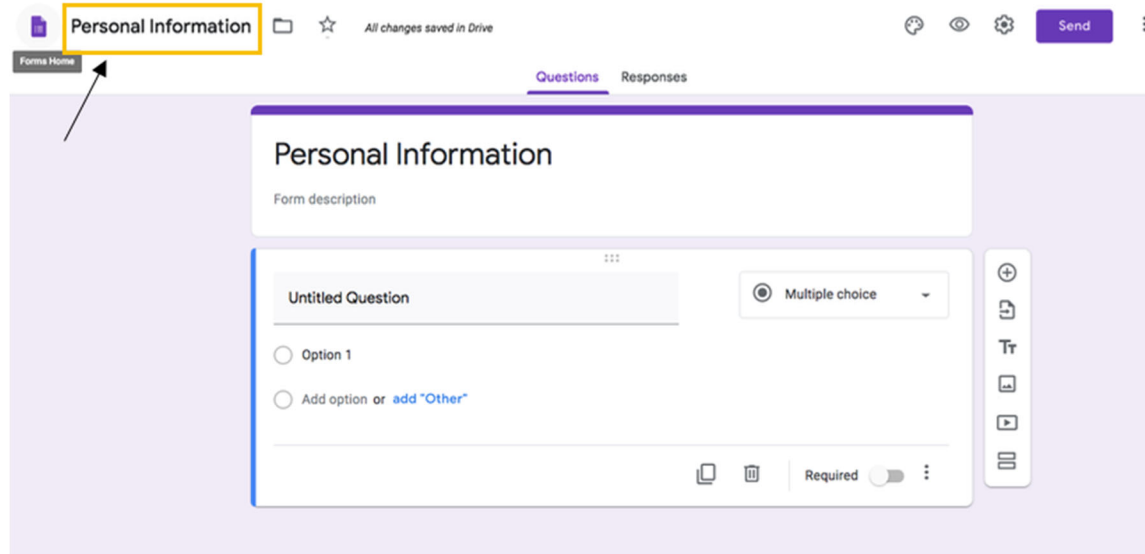
Fig. 42 Adding the form title

5. Click the description box and enter the instructions for conducting the instructional

   activity (Fig. 43).
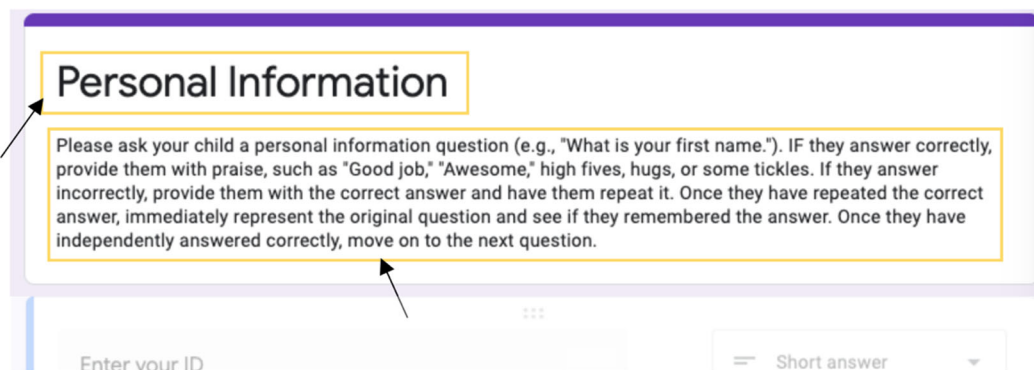
Fig. 43 Adding the activity description

6. Navigate to "Untitled Question" below the form's "Title" box.

7. Create a form identifier by instructing users to identify who is conducting the session

   (e.g., "Enter your ID") and selecting "Short answer" from the drop-down menu (Fig. 44).

   Creating a form identifier will allow those viewing the responses to easily organize form

   responses (see "Viewing Form Responses").

8. Click the "Required" button on the bottom of the screen (Fig. 44).
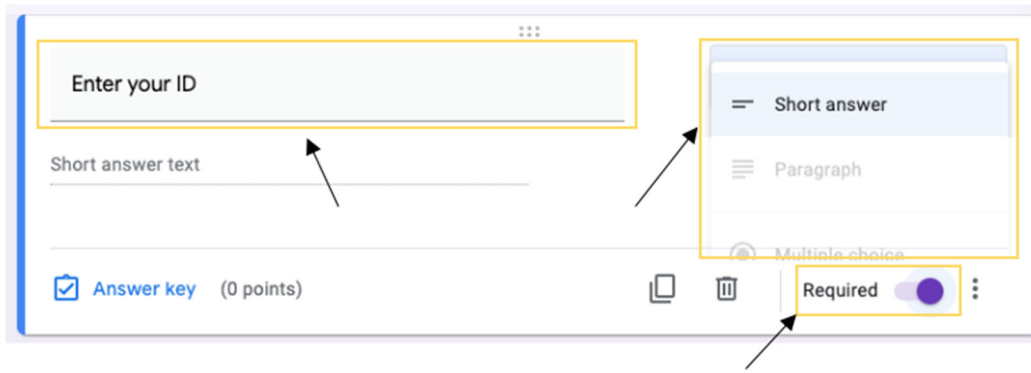
Fig. 44 Creating a form identifier

9. Click the "Add question" button (Fig. 45)
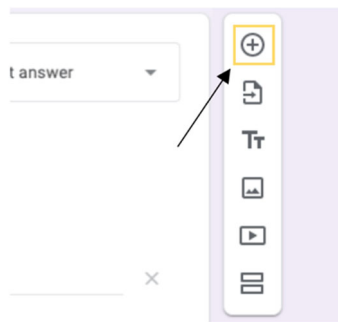
Fig. 45 Adding questions

10. Select the "Question" box and enter a question into the box (e.g., "What's your first

    name?").

11. From the dropdown menu, select "Multiple Choice," (Fig. 46).
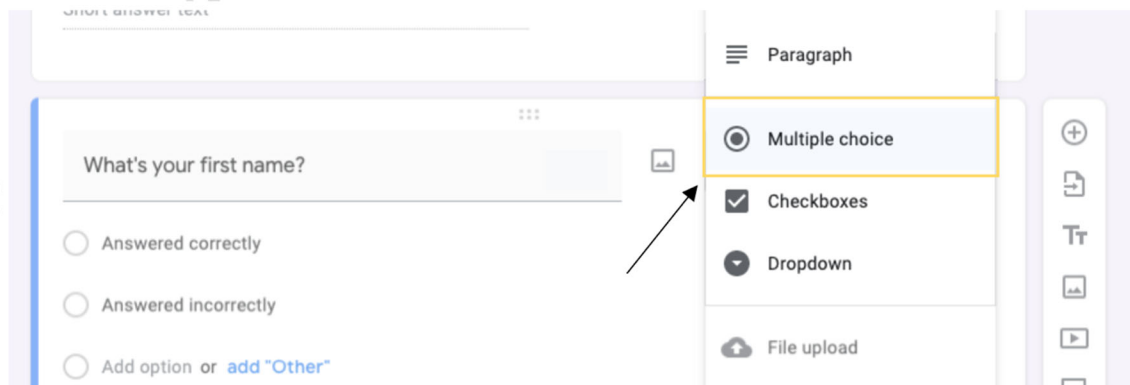
Fig. 46 Creating a multiple choice question

12. Click "Option 1" and type, "Answered correctly" (Fig. 47).

13. Click "Add option" and type, "Answered incorrectly" (Fig. 47).

Fig 47 Inserting question and answer options

14. Click the "Add question" button (Fig. 45) and repeat steps 10-13.

Viewing Form Responses:

1. Navigate to Google Forms by entering https://www.google.com/forms/about/ into a web browser.

2. Click on "Go to Google Forms" to view quizzes (see Fig. 40).

3. Select a quiz.

4. Along the top of selected quiz, click on the "Responses" button (Fig. 48).
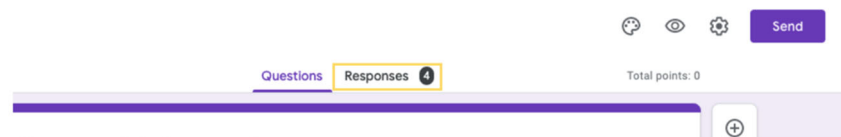
Fig. 48 Navigating to form responses

5. The response page will allow the reader to view the following:

   a. To view a summary of all responses, click on the "Summary" button (Fig. 49)

   b. To view a summary of each question, click on the "Question" button (Fig. 49).

    c.   To view a summary of each individual quiz, click on the "Individual" button (Fig. 49).

    d.   To view a breakdown of each session in Google Sheets, click on the Google Sheets icon.
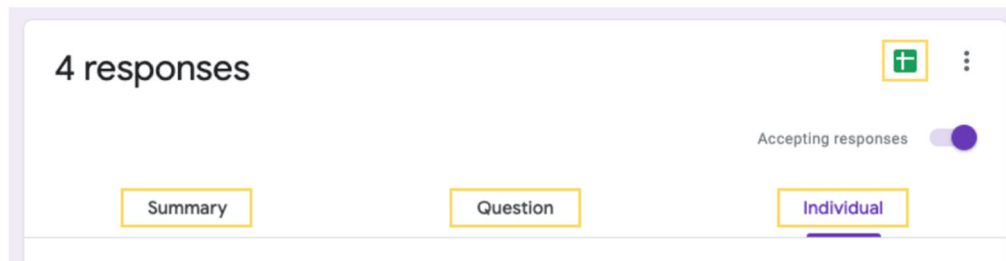
Fig. 49 Options for viewing form responses

Sharing Materials and Instructional Activities

There are several options for sharing instructional materials with clients and families using the Google Drive and Google Classroom applications. BCBAs can create and share a link to an individual Google Drive file, create and share a Google Drive folder, or build a Google Classroom to organize and store multiple activities. It is important to note that:

1.   BCBAs should publish any Google Slides instructional activities that have linked slides (e.g., selecting colors, numbers, letters, etc. from an array, identifying body parts from a stationary background).

2.   Drag and drop activities should be shared as an individual file or as part of a Google Drive folder because the interactive features will not work in published slides.

3.   For independent activities, BCBAs should direct clients and families to use the linked stimuli and navigation arrows to navigate the Google Slides presentation instead of the standard Google navigation bar.

Sharing an Individual File:

1. Navigate to https://drive.google.com.

2. Open file to share.

3. Select the yellow "Share" button in the top right corner.

4. Click on "Get shareable link."

5. A pop-up menu will appear that provides sharing options (Fig. 50).

   a. Select "Anyone with the link **can view**" Or "Anyone with the link **can edit**."

   b. Select "Copy link."
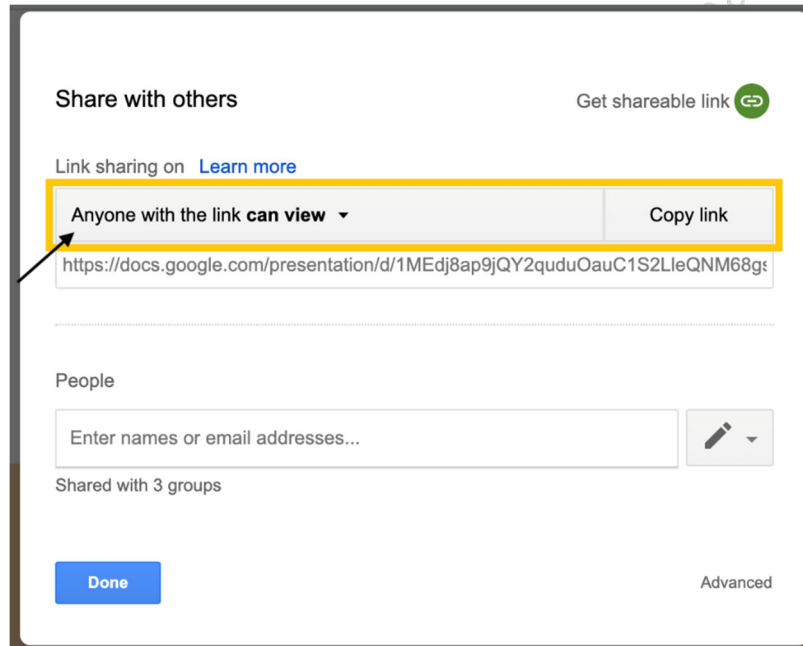
Fig. 50 Pop-up menu with sharing options

6. Share the link to the family/client by pasting it into a message.

Creating and Sharing a Folder:

1. Navigate to https://drive.google.com.

2. Select the multicolor plus on the top left side of the page.

3. Select "Folder" in drop-down menu.

4. Name the new folder.

5. Add items/documents to the folder by dragging and dropping files or clicking the "New" button.

6. Right click on folder and select the "Share" option (Fig. 51).
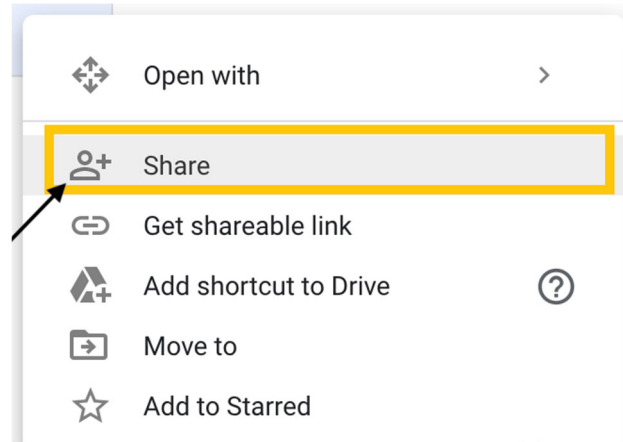
Fig. 51 Share option

7. A pop-up menu will appear (Fig. 50) that provides sharing options, including view-only or editable access. Repeat steps 3 and 4 from "Sharing an Individual File".

Publishing Slides:

1. Open a completed Google Slides presentation.

2. Navigate to "File" located on the toolbar.

3. From the dropdown mean select "Publish to the web" (Fig. 52).
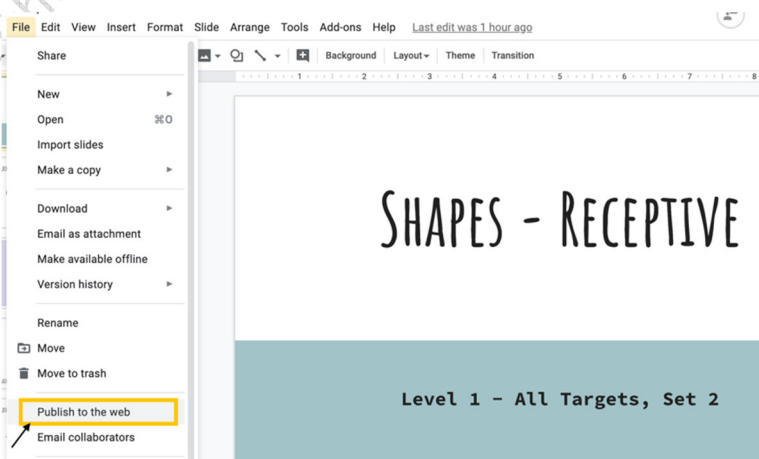
Fig. 52 File drop-down menu with Publish to the web option

4. A *Publish to the web* pop-up menu will appear (Fig. 53).

    a. Change Auto-advance slides time to "every minute".

    b. Select the box next to "Start slideshow as soon as the player loads".

    c. Press "Publish".
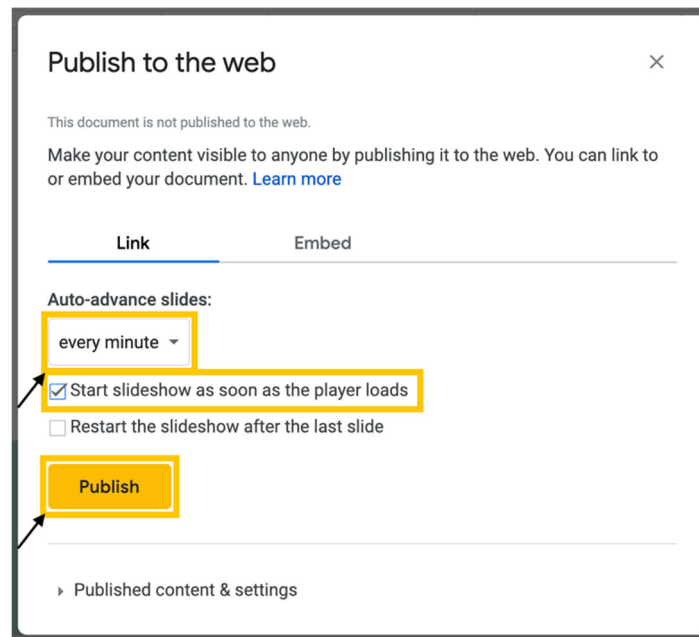
Fig. 53 Publish to web pop-up menu

5. Right click on link. Copy and share the link to the family/client by pasting it into a

    message.

Google Classroom

To set up a Google Classroom, BCBAs will need a Gmail account. For privacy purposes,

we recommend creating an individual classroom for each client. It is important to note that only

individuals with Gmail accounts can join and interact with the classroom.

Creating a Google Classroom:

1. Navigate to https://classroom.google.com/h.

2. Select the "+" in the top right-hand corner to create a new classroom (see Fig. 54).
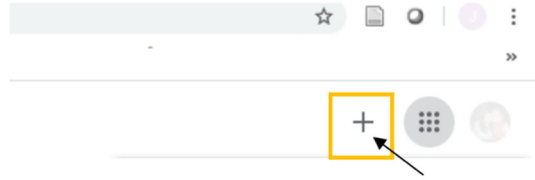
Fig. 54 New classroom creation button.

3. Select "create class" from the drop-down menu.

4. A dialogue box will appear inquiring as to whether or not the classroom will be utilized

   for a school. If using Google Classroom as a private agency, check the box and click

   continue (see Fig. 55).
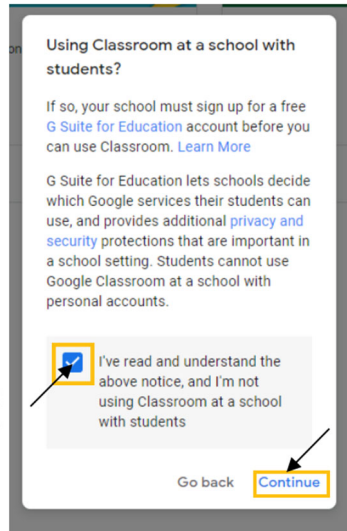
Fig. 55 Google Classroom terms of use policy

5. Type the class name into the dialogue box (Fig. 56).

6. Type a section name (e.g., client's initials) in the following tab (Fig. 56).

7. Select "Create" (see Fig. 56).

Fig. 56 Class specifications

8. The classroom will now appear in the Google Classroom homepage (see Fig. 57).
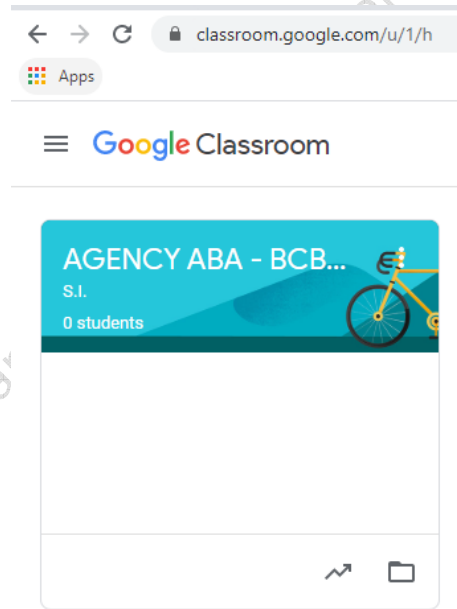
Fig. 57 Google Classroom homepage

Adding Clients and Caregivers to Google Classroom:

1. Provide clients and/or caregivers with the Google Classroom code (See Fig. 58).
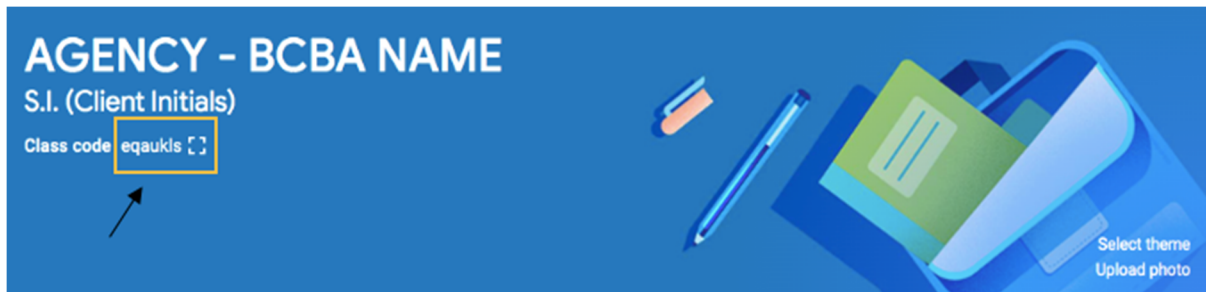
Fig. 58 Google Classroom code

2. Direct clients and/or caregivers to navigate to https://classroom.google.com/h.

3. Clients and caregivers will need to select the "+" in the top right-hand corner (Fig. 54),

    click "Join class", and enter the class code (See Fig. 59).
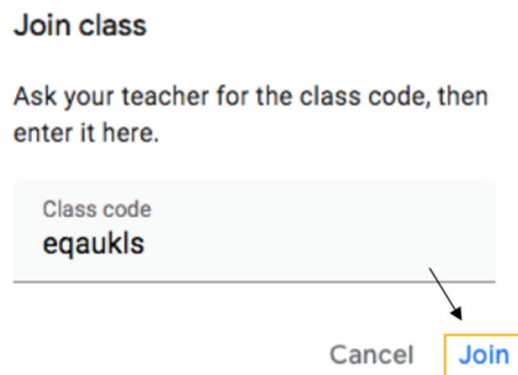
Fig. 59 Join class screen

Google Classroom Features

Google Classroom is a digital teaching platform that allows instructors to organize

instructional content by topic, add assignments, and post announcements. By following the

process below, BCBAs can add any digital content developed using Google Slides or Google

Forms into a Google Classroom assignment.

Creating Topics:

1. Navigate to the "Classwork" tab.

2. Click "Create" and select "Topic" from the drop-down menu (see Fig. 60).
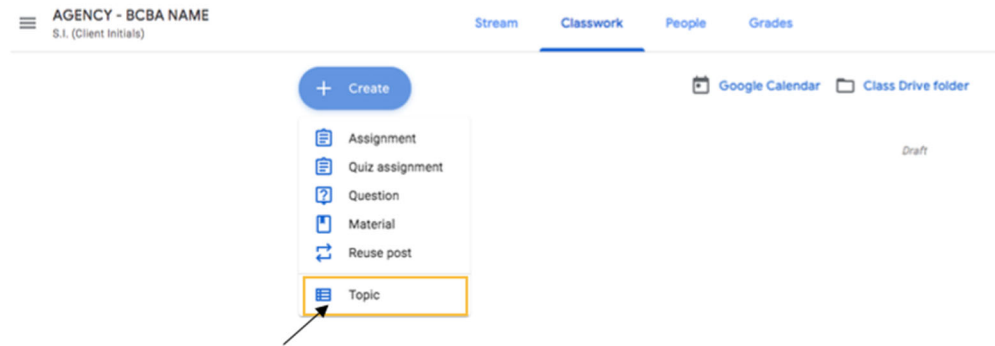
Fig. 60 Creating topics

3. As shown in Figure 61, type a topic name (e.g., Independent Activities) into the box, and click "Add". Drag and drop instructional content into the topic area from the assignment list above or assign a topic while creating an assignment (see "Creating Assignments"; Fig. 64).
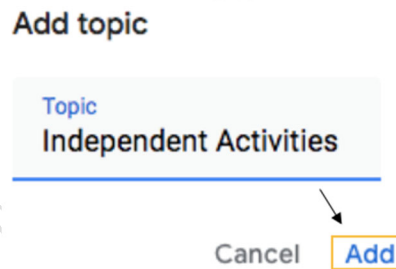
Fig. 61 Naming and adding topics

Creating Assignments:

1. Navigate to the "Classwork" tab.

2. Click "Create" and select "Assignment" from the drop-down menu (see Fig. 62).
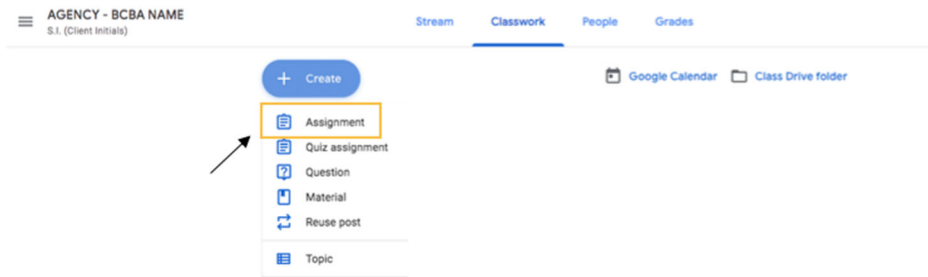
Fig. 62 Creating an assignment

3. Create an assignment title in the "Title" text box and provide instructions for clients/

   parents in the "Instructions" field, if necessary (Fig. 63).

4. Attach a Google Slides activity, Google Form, or other materials by clicking the "Add"

   button (Fig. 63).

   a. To insert instructional content from Google Drive, select "Google Drive",

      navigate to the relevant file, and click "Add".

   b. To insert a link, select "Link", copy and paste the link into the box, and click

      "Add link".

   c. To insert a computer file, select "File", drag the file into the box or select it from

      a device, and click "Upload".
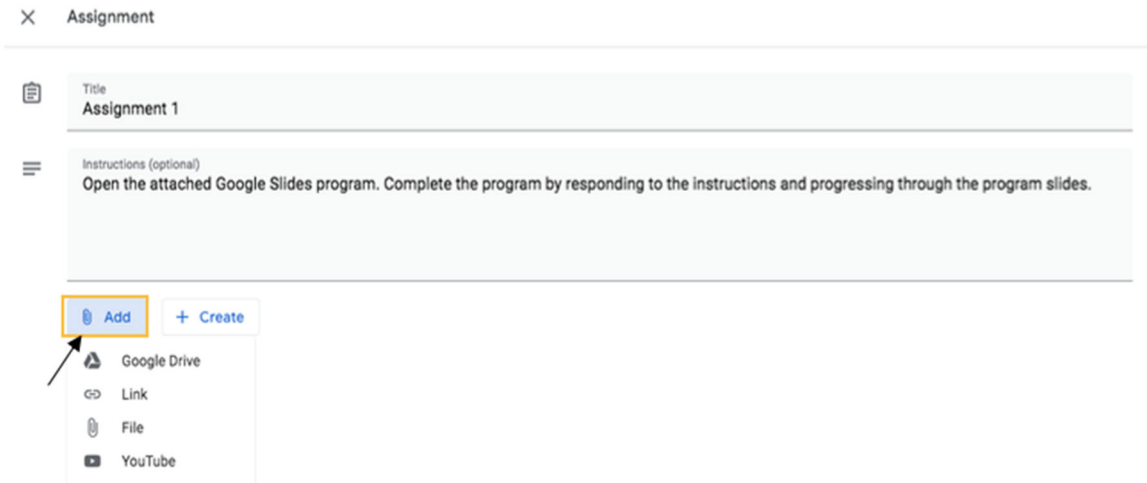
Fig. 63 Creating an assignment

5. Adjust points, due date, topic, and rubric as necessary by clicking on the respective

    drop-down menus, as shown in Fig. 64.
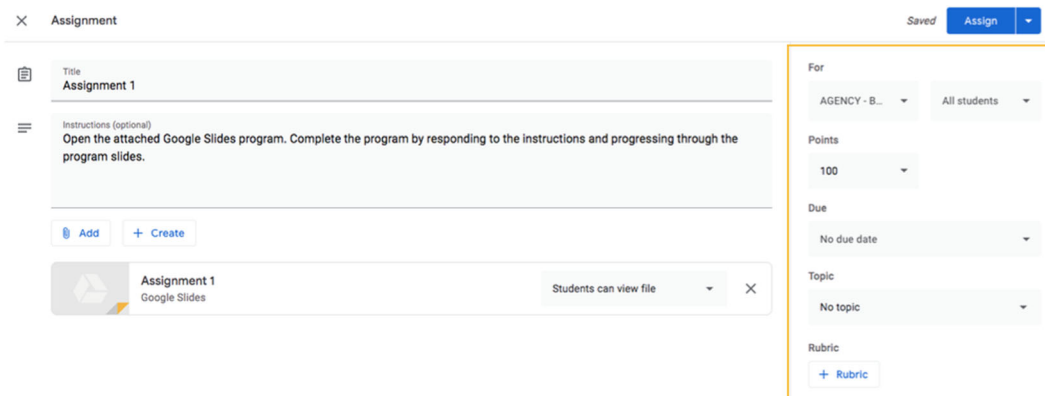
Fig. 64 Assignment-specific adjustments

6. Navigate to the top right-hand corner of the screen and click the arrow next to the blue

    "Assign" button. Select "Assign", "Schedule", or "Save as Draft".

7. Repeat steps 2-6 to develop additional assignments.

Practice Recommendations

Although the Google applications described above provide an online platform for creating and sharing digital instructional activities, it is important to note that BCBAs will still need to assess client and caregiver prerequisite skills, train caregivers to conduct the activity, structure the instructional trial arrangement, program feedback, and develop a data collection system.

Prerequisite Skills

BCBAs should assess client and caregiver prerequisite skills prior to implementing digital instructional activities. In order to effectively interact with independent instructional content, clients need basic computer skills (e.g., ability to navigate a keyboard or touch-screen), attending and discrimination skills (e.g., ability to attend to, scan, and select stimuli on a screen), and basic independent work skills (e.g., ability to engage with the instructional content for the duration of the activity with minimal caregiver support). Before assigning caregiver-supported instructional activities, BCBAs should consider the prerequisite skills clients need to successfully participate in each activity. BCBAs should also assess caregiver prerequisite skills (e.g., stimulus/instructional control) and provide appropriate training, perhaps via telehealth, to ensure that the caregiver can facilitate client interaction with digital instructional activities effectively.

Caregiver Training

There are many ways to provide telehealth support using videoconferencing platforms such as Zoom (Zoom Video Communications, Inc., 2011), Vsee (VSee Lab, Inc, 2008), or GoToMeeting (LogMeIn, 2004). An in-depth guide to parent training is beyond the scope of this paper. However, there are several behavior analytic training strategies that may be useful including Behavioral Skills Training (Sarakoff & Sturmey, 2004) and remote in vivo coaching (Bowles & Nelson, 1976).

Instructional Trial Arrangement

BCBAs should also be aware that there are many ways to arrange trials within instructional activities. Common options include massed-trial teaching (MTT) and interspersed-trial teaching (ITT). During traditional MTT, an instructor presents the same acquisition target several times consecutively within a session (Herickson, Rapp, & Ashbeck, 2015). During ITT, an instructor incorporates mastered and/or non-mastered targets within a session (Herickson, Rapp, & Ashbeck). The Google Slides and Google Forms applications allow BCBAs to design an instructional sequence in many different ways. Thus, when creating digital instructional activities, BCBAs should continue to customize and individualize client programming.

Providing Feedback

Praise. Research has demonstrated that praise may function as a reinforcer for some children with ASD and other related disorders (Joachim & Carroll, 2018; Paden & Kodak, 2015). BCBAs can use Google Slides functions to incorporate praise into independent instructional activities by creating praise slides and linking them to the "correct answer" stimuli. BCBAs should customize praise slides to individual learner preferences. For example, praise slides may include pre-recorded auditory praise statement stimuli (e.g. "Good job!") or sound clips (e.g., bells, dings, favorite songs). Praise slides can also include visual stimuli into praise slides such as cartoon images (e.g. favorite characters, balloons, or flowers), moving images (e.g. gifs), or videos (e.g. YouTube links). BCBAs will also need to train caregivers to provide praise and reinforcement during caregiver-supported instructional activities.

Prompting and error correction. When completing instructional activities, clients are likely to make errors. Therefore, BCBAs need to consider the types of error-correction procedures that will be most appropriate for their clients (Leaf et al., 2016). Common

components of an error correction procedure include: (a) demonstration of the correct response, (b) an active client response (requiring a student response after the prompt), (c) repeated representation of the instruction, and (d) differential reinforcement of the correct response (Cariveau et al., 2019). There are multiple ways to build error correction into independent instructional activities using Google Slides. For example, BCBAs can provide prompts on "error correction" slides. Prompts may include the addition of pictures that point to the correct answer (e.g., a finger or an arrow), animating the correct answer (e.g., making the correct answer spin or zoom in an out), or the addition of an auditory prompt that includes the correct response (e.g., "this is the square"). The error correction slide can include a simple visual/auditory prompt, or the BCBA can elect to include a link among the possible responses to require an active student. BCBAs will also need to consider prompting strategies for caregiver-supported activities (e.g., providing a vocal prompt of the correct response, or requiring an independent response before continuing) and provide caregivers with the proper training to correct errors.

Data Collection

Data collection is an important part of any ABA program (Baer et al.,1968) and it is particularly important during interruptions to in-person services. It may be possible for the BCBA to record instructional sessions (provided that they have consent from the caregiver) and collect data from the recording. If this type of data collection is not possible, it is important to design systems that caregivers can easily manage in the home. Existing literature suggests that estimation (Ferguson et al., 2019; Taubman et al., 2013) and probe (Ferguson et al., 2019; Lerman et al., 2011) data collection systems can provide a reasonable estimate of skill acquisition performance. Caregivers can also use Google Forms to collect data on instructional activities. As demonstrated above (see "Creating a Google Form"), BCBAs can arrange Google

Forms so the caregiver or family member running the activity can quickly indicate whether the client answered correctly or incorrectly. Once the Google Form is submitted, these data can be organized and analyzed easily.

Discussion

During service disruptions such as those caused by the current COVID-19 global pandemic, BCBAs may need to consider alternative ways to provide clients with appropriate instructional activities. In today's society, there are many technology-based options for creating digital activities to mitigate service gaps in situations where in-person treatment is not feasible. Google applications, such as Google Slides, Google Forms, and Google Classroom, provide BCBAs with an easy and accessible way to create and share these digital materials.

Although there are many potential benefits to creating digital instructional activities using Google applications and planning for their use with clients, there are some potential limitations worth mentioning. First, recipients need to have a Gmail address to access and use the materials. Second, BCBAs may need to carefully check and troubleshoot issues with linking stimuli, auditory files, navigation arrows, and protecting the slide. We have incorporated troubleshooting suggestions into the task analyses for these particular functions. Finally, creating high quality digital instructional content can be a time-consuming process. Given that clients and families will likely have immediate service needs, BCBAs will need to find other ways to continue treatment, perhaps by conducting standard instructional programming via telehealth, while simultaneously preparing digital instructional activities to supplement these telehealth-based services.

We hope that this paper will provide BCBAs with some useful tools for creating digital content to share with clients and caregivers. While there is no question that direct intervention by

trained behavior technicians, under the supervision of a behavior analyst, would likely produce

significantly more beneficial impacts than interacting with the activities proposed in this paper, it

is possible that interaction with these instructional activities may mitigate some of the skill loss

that could occur due to disruption in direct service provision. Future researchers may address this

question. In addition to potentially reducing the impact of service disruptions during the current

crisis, BCBAs may be able to provide digital content to support clients when there are

geographic barriers to in-person treatment or when unforeseen circumstances (e.g., illness or

injury to a family member) arise. When standard ABA services resume, BCBAs may also

incorporate digital instructional activities to supplement in-person services. As such, we hope

that the processes described above will be useful both during and beyond the COVID-19

pandemic.

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Appendix A: Creating Independent Instructional Activities

TITLE SLIDE

Building a Google Slides Presentation
Steps 1 - 4

NUMBERS - RECEPTIVE

INSTRUCTION PAGE

Creating an Array of 3
Steps 3 - 11

Inserting Audio Files
Steps 1 - 6

TOUCH TWO

2   1   4

Adding Links
Step 1 - 6
Correct Response ⦿ Praise page
Incorrect Responses ⦿ Error Correction Page

Adding a Protective Film
Step 1 - 6

PRAISE PAGE*

Creating an Array of 3
Steps 12 - 14

Inserting Audio Files
Steps 1 - 6

YAY!

NEXT

Adding Navigation Arrows
Steps 1-6

Adding a Protective Film
Steps 1 - 6

ERROR CORRECTION PAGE*

Creating an Array of 3
Steps 15 - 16

Inserting Audio Files
Steps 1 - 6

TRY AGAIN

GO BACK

Adding Navigation Arrows
Steps 1 - 6

Adding a Protective Film
Steps 1 - 6

*See Practice Recommendations