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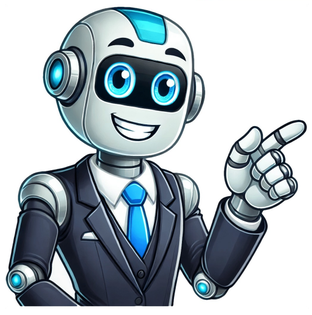

Teaching with multiple instructions helps learners to generalize because

If a behavior is maintained: Then the individual continues to perform it after intervention has stopped How well did you know this? 2 3 4 As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice . 2021 Jul 8;14(3):831–838. doi: 10.1007/s40617-021-00611-6 Social deficits are a common feature in individuals with low incidence disabilities. Current solutions used to teach social skills are not always effective, especially when it comes to generalizing these skills to novel contexts. General case programming (GCP) is an instructional methodology founded on the science-based tenets of Direct Instruction, designed to clearly communicate the multiple contexts and response variations a learner is likely to encounter in their complex social environments. The purpose of this article is to describe how GCP can be utilized to help program for generalization of social skills. Keywords: instruction, social skills, direct instruction, generalization, teaching, replacement behavior When queried, every teacher can immediately name students whose chronic bickering, name calling, extreme shyness, inability to share, physical aggression, and/or withdrawal has been a constant disruption to the learning process of that student and the rest of their class. Students displaying these behaviors can be characterized as having deficits in social competence. These students are widely reported by teachers to be among the greatest challenges faced in the classroom (Westling, 2010) and teacher preparation programs rarely provide adequate content related to teaching students with communication and behavioral disorders (Oliver & Reschly, 2010). Though supported inclusion should be a goal, simply placing these children and youth with social deficits in mainstreamed school settings or exposing them to competent models is not sufficient to foster appropriate behaviors (Mooney Patterson, 2018; Sazak, 2003). These children will require instruction in appropriate social behaviors that, when practiced away from training, will facilitate positive interaction with peers (Lewis et al., 1998; Watkins et al., 2017). In response to these concerns, several curriculum programs are commercially available for training specific social skills. However, in general evidence supports the notion that social behaviors do not typically generalize from training to other settings in a subject's environment (Hutchins et al., 2020; Gunning et al. 2019). This should not be surprising because research has reported that preservice teachers typically receive little to no training in strategies to promote generalization (Markelz et al. 2017). Poor generalization is an instructional problem (Scott & Nelson, 1998; Stokes & Baer, 1977) which often resembles the following examples. Mr. Bold has been working with Robert to greet others appropriately. He has become frustrated because every real-life opportunity to practice this skill seems to be just different enough from training examples to confuse Robert. At other times, Robert has performed an appropriate greeting response, but at an inappropriate time. Mr. Bold laments to his fellow teachers, "There are just too many possible scenarios to efficiently train Robert to mastery." Mrs. Mild has been teaching social skills to a group of students who have been disruptive on the playground. Like Mr. Bold, Mrs. Mild has become frustrated because the students in her group always seem to find an activity on the playground that was not specifically covered during training. She trained her students how to wait in line for a basketball rather than to run into the middle and disrupt a game. The next day Jenny disrupted a soccer game while trying to become involved. Mrs. Mild queried Jenny and reminded her of the previous day's lesson. Jenny replied, "But that was basketball, not soccer!" Mrs. Mild asks in defeat, "Do I have to train every possible game and activity that conceivably could occur on a playground?" Ms. Cordial is a new instructional aide in a low incidence classroom. The students in the class are practicing how to ask relevant questions during conversations with peers. Similar to Mr. Bold and Mrs. Mild, Ms. Cordial notices that the students seem to do great when they follow a script tied to a specific topic. However, she notices that none of the students ask each other questions outside of these exercises. In actuality, Mr. Bold, Mrs. Mild, and Ms. Cordial are all correct in their judgment of the problem behind their students' failure to generalize trained social behaviors. Their frustration comes, in part, from the relative successes they've achieved in teaching academic lessons. Simple "if, then" statements often suffice as a rule to prompt behaviors across academic examples (e.g., knowing when a story problem requires addition or determining when to add a question mark to the end of a sentence). However, when dealing with the social realm, the key events that should prompt appropriate behavior are often too subtle, vary greatly across people, and can change in the presence of different individuals or groups (Scott & Nelson, 1998). Thus, students often fail to recognize relevant environmental cues and, as a result, may act in undesirable ways and/or at undesirable times. However, social skills instruction need not involve teaching every possible situation that might occur. General case programming (GCP), or general case instruction, is an instructional methodology based on the principles of Direct Instruction (Engelmann & Carnine, 1982; Engelmann & Colvin, 2006) that has proved to be a critical component of instructional programs that are effective in fostering generalized responding. Direct Instruction (DI; capital D and I) refers to a precise manner of assessing, planning, and delivering instruction. In contrast, direct instruction (di; small d and i) typically refers to instruction that is delivered by the teacher directly to the students. It can be said that all DI contains di, but not all di meets the standards of DI, which are well-delineated (e.g., Engelmann & Colvin, 2006). DI and the inherent components of GCP, and DI was included in the Board Certified Behavior Analyst Task List, fourth edition (Behavior Analyst Certification Board [BACB], 2012), although it was not included in the fifth edition (BACB, 2017). In the research literature, GCP was well-described at least 30 years ago (Albin et al., 1987; Day & Horner, 1986; Day & Horner, 1989; Horner et al., 1982; Romer et al., 1994). Although direct instruction of social skills has continued to be reported in the literature, these examples do not typically adhere to the tenets of Direct Instruction as described by Engelmann and Colvin (2006). That is, they do not follow a key set of guidelines and prescriptions associated with GCP. A scan of the literature on social skills instruction is typically highlighted by the term "direct instruction," but this typically means only that lessons are delivered by teacher as a lesson, as opposed to more open-ended or Socratic methods. DI is comprised of science-based practices for both lesson development and the delivery of instruction, with teaching meant to clearly communicate content to students (Watkins & Slocum, 2003). Within Direct Instruction programs, GCP refers to the planning and development of a lesson, with an eye toward generalization and helping learners navigate complex novel social environments. The applications for this methodology are numerous and include important social behaviors related to communication (Chadsey-Rusch et al., 1993; Drasgow & Halle, 1995; Hicks et al., 2011; Hicks et al., 2015; Knapczyk, 1989; O'Neill, 1990; O'Neill et al., 2000), compliance (Walters et al., 2007), observational learning (Tekin-Iftar & Birkin, 2010), personal hygiene (Stokes et al., 2004), dining (Lehman et al., 1996; Steere et al., 1990), grocery shopping (Horner et al., 1986a), using chip-debit cards (Milata et al., 2020), and vocational training (Horner & McDonald, 1982; Horner et al., 1986b). GCP is an instructional methodology that prescribes a specific protocol for selecting examples for both teaching and testing, as was first described by Horner et al. (1982). The key to GCP is teaching the student the general rather than specific conditions under which behavior should occur (e.g., all games that involve two teams versus basketball). The "general case" has been taught when critical features across a variety of situations control appropriate responses. This article presents a step-by-step description of how this process can be applied to social skills instruction. Designing instruction according to a GCP methodology requires six basic steps that cover everything from initial assessment to testing. These steps involve actions specific to assessment, planning, and teaching. These steps and their guiding questions are summarized in Table 1 and detailed below.fv Guiding Questions for the Six Key Steps to General Case Programming Step 1 Define All Situations in which Target Behavior is Desired • What is the behavior to be taught and when/why should it occur? Step 2 Assess the Range of Conditions under which the Target Behavior is Desired • Under conditions when the behavior should occur, what are the key environmental features to which the student should attend? • Are there classes of these environmental variables that can be identified and used to create teaching examples? Step 3 Select Examples from the Instructional Universe for Use in Teaching and Testing • What examples sample the range of key environmental features and can be used during instruction? Step 4 Sequence Teaching Examples • Does instruction include a range of positive examples followed by minimally different nonexamples to help the student discriminate? Step 5 Teach the Examples • Is the content taught in a direct and explicit manner with opportunities for active student engagement and frequent feedback? Step 6 Test with Nontrained Probe Examples • Do testing examples sample the range of natural variation and are they novel to the student? The first step in the GCP process involves defining all possible situations (locations, times, contexts) in which target behaviors are desired to occur. In Direct Instruction, this is commonly referred to as the universe of examples (Engelmann & Colvin, 2006) or what GCP refers to as the instructional universe. This will be specific for each individual student and response class. For instance, Mr. Bold may select an instructional universe for Robert that is as small as "Robert will meet John and Susan with an appropriate greeting when in the library" or as big as "Robert will meet all other persons on the school grounds with an appropriate verbal or gestural greeting." Thus, the instructional universe is defined not only in terms of the conditions in which the behavior is to occur but also by the behaviors that the student would be required to perform in order to achieve a particular outcome. Although a narrowly defined instructional universe likely will need little analysis for effective instruction, as the size and/or complexity of the instructional universe increases, the need for and effects of GCP increase. As another example, Mrs. Mild is attempting to define an instructional universe for appropriate entering into activities with peers on the playground. She must carefully assess the context in which this behavior will take place (e.g., the playground) and the variations in stimuli within that setting (e.g., different types of activities, people, contexts). In addition, the desired outcome (i.e., appropriate entering behavior) is considered in relation to both the student's ability to perform that response (can fully perform/can only perform piece of skill) and the norm for entering among peers in similar situations in the environment (how other children enter into various activities). Thus, Mrs. Mild must ask (1) Where and under what circumstances should this behavior occur? (2) At what level of entry skill can Jenny perform? and (3) What is the norm for performing this skill in this setting? After carefully assessing each of the above questions, Mrs. Mild defines the instructional universe as "appropriate entering into all games, activities, and conversations on the playground." The size of an instructional universe should reflect the relevancy of the performance of the skill across contexts. At first, Robert may be learning to greet others as a way to open up further social communication. However, it may also be relevant for Robert to learn how to use greetings more functionally as a way to direct a conversation (e.g., "Hi, thanks for offering to help with my homework") or as a way to prime others to follow through with his requests (e.g., "It is really great seeing you today"). Likewise, if Jenny is truly in need of skills to enter into all games, activities, and conversations, then meeting her instructional needs will require the universe to be much larger than "appropriate entry into all games on the playground." Finally, at first Ms. Cordial's students may be learning how to hold the attention of peers during conversations by asking questions. However, these skills will also be relevant when conversing with nonpeers or when asking questions for the purpose of gathering information about a new subject. The larger the instructional universe, the more powerful the general case methodology becomes. Any description of the instructional universe includes a definition of the context in which the behavior is to take place and the different activities that might be typical in those contexts. The teacher must now determine the range of different conditions under which the target behavior should occur, and the range of appropriate target behaviors. As the instructional universe grows, a thorough assessment of that universe becomes an increasingly laborious task. As a first step, the teacher must determine the exact skills that make up the target behavior. This may be accomplished by completing a task analysis of the targeted skills (Stokes et al., 2004). In general, a separate assessment of the instructional universe is required for each discrete component skill being taught. That is, one set of conditions may be a prompt for selecting and approaching an activity, whereas an entirely different set of conditions would be appropriate for actually entering into that activity. Each target behavior being taught will require its own assessment of the instructional universe. The assessment process can be broken into two steps: (1) identifying the situations that should serve as a discriminative stimulus or signal the target skill and (2) defining the range of relevant variation of those situations. When assessing the instructional universe, a general case program (GCP) analysis form will be helpful in recording and organizing this information (Horner et al., 1982). Figure 1 presents an example of a GCP analysis form for Jenny. Notice that the behavior defined in Jenny's instructional universe (entering into games, activities, and conversations on the playground) has been task analyzed into four discrete component behaviors: (1) approaching, (2) inquiring, (3) following waiting protocol, and (4) physically entering. Within the form, analyses were performed on each of these component behaviors. General Case Analysis FormThree different assessment techniques exist for varying degrees of universe complexity. If the teacher is familiar with the target behavior it may be possible for them to use past experience to come up with the range of relevant variation in conditions and appropriate responses. This is the simplest method of assessment and is used only when the instructional universe is small. For example, if the universe for Jenny had been restricted to "appropriate entering into a basketball game on the playground," the instructor likely would be able to recall all possibilities for entering, the exact situations, and the appropriate norm for that behavior. In this case, a formal assessment of the instructional universe would not be necessary. If the universe is small but the teacher is not experienced in that realm, consultation with an expert may be adequate. A partial sample of the universe may be called for when (1) the behavior is more complex, (2) the teacher is less familiar with the behavior, or (3) when time constraints do not allow a thorough assessment. In general, partial samples of the instructional universe consist of the teacher performing the target behavior in five to eight strategically located settings and recording the range of conditions and appropriate behavioral responses that are present. A complete assessment of the instructional universe for social behaviors is a preferred yet generally unobtainable result. The instructor rarely will be able to actually assess each and every discrete situation or context within a universe. Instead, the universe will be categorized into groups of similar characteristics (i.e., groups of situations that share critical features). Teaching examples are then selected from those groupings, making certain that students see a range of critical features across examples. For instance, if the universe were defined as appropriate entering into any activity that occurs at school, rather than systematically assessing each and every activity in existence, the instructor might group the universe by similarities such as "activities where waiting in line is required versus activities where participation does not require line waiting" or "individual activities versus team activities." In each of these cases, a range of teaching examples would be selected from each identified class. The manner in which the teacher breaks up the universe depends upon the skills of the student, the complexity of the target skill in question, and the range of critical features identified across universe. For example, Mrs. Mild has defined the instructional universe as "appropriate entering into all games and activities that occur on the playground." Her assessment of the range of variation in conditions yields three classes: (1) activities requiring set waiting rules (e.g., two-square, checkers, tether-ball), (2) activities requiring waiting for an opening with no set rules (e.g., swings, merry-go-round, use of group toys), and (3) activities requiring entrance requests (e.g., football, soccer, hide and seek). Each of these unique classes is then examined for the range of variation. By grouping similar conditions into classes and selecting examples from each class, Mrs. Mild can now teach key features of each class rather than teach every individual example. Using the above example, each of these types of distinct classes of conditions is then analyzed as to the topography of each specific condition, the amount of variance that might be encountered, and whether that variance is a relevant prompt for the target behavior. For example, when attempting to enter an outdoor activity requiring set waiting rules, the wait may be determined either by where a student stands (e.g., two-square), by writing name in chalk on blacktop after last name (hopscotch), or by some other identifier. This distinction is a relevant variation of the conditions under which desired behavior should occur. Further, this relevant variation requires that training present and teach these relevant differences. Whether a teacher is present or whether the game is being played by girls or boys are examples of irrelevant variations that should not predict the response—but also will need to be varied across teaching examples. At times, variation in conditions will act as a specific prompt for variation in response. For instance, when greeting a friend, a high five may be completely appropriate. However, when in a job interview or other more formal situation, a handshake is the appropriate greeting response. The teacher's task is to identify these conditions and to determine whether they are large enough to constitute being taught as a separate group of conditions or whether they are small and isolated enough to be taught as exceptions. Guidelines for the selection of training examples are presented below. Once the range of relevant condition and response variation within the instructional universe has been defined, sample conditions must be chosen for teaching and testing. These examples must effectively cover the range of conditions and response variation as defined in the universe (Chadsey-Rusch & Halle, 1992). Using a range of examples allows the student to learn a skill under the range of situations that occur in the natural setting. This practice of presenting multiple examples is a foundation of Direct Instruction and critical for GCP (Engelmann & Carnine, 1982; Horner, McDonnell et al., 1986c). Table 2 contains a summary of guidelines that have been developed for example selection. Guidelines for Selecting Examples for Training and Testing 1 Select the minimum number of teaching examples that sample the range of stimulus and response variation in the instructional universe. 2 Select examples with equal amounts of new information. 3 Select examples that vary irrelevant stimuli. 4 Select examples that teach the learner what not to do as well as what to do. 5 Select examples that include significant exceptions. 6 Select examples that are logistically feasible. The first step in selecting examples is to look at the response or responses the student is to learn and to define the conditions under which the behavior is desired. The next step is to systematically examine the variation in those conditions across situations in the universe. Once this is done, examples from each different class of conditions can be selected for use. Returning to Mrs. Mild, the universe of activities that could be entered into at school has been defined and assessed with regard to condition and response variation and she has used this assessment to divide all activities in the universe into three distinct categories. Because she has observed that the entering response requires that a student first approach a game or activity and determine, by its specific conditions, how entry is to be conducted; selection of examples will now be made by systematically choosing games from each identified class of conditions. Referring back to Figure 1 as an example, Mrs. Mild may choose to teach using examples of soccer, checkers, two-square, and merry-go-round. Thus, examples from each of the three previously identified classes of conditions have been selected. Based on a logic first published by Siegfried Engelmann (Engelmann & Carnine, 1982), Horner, McDonnell et al. (1986c) suggest that positive examples include significant exceptions to the usual situation (e.g., where others are attempting to enter at the same time, where two waiting lines exist.). They caution, however, that training examples should remain "logistically feasible in terms of cost, time, and location" (p. 293): there are times when it will not be appropriate to request entering or when activities may not be open. For example, it is possible that some activities on the playground are for certain ages or groupings of students and may not be entered (e.g., group lessons, time-out). The student will need to be aware of and be able to recognize these specific conditions. It is important that these types of negative examples be included in training because their occurrence in the natural environment will be a relevant feature in that it will require a specific appropriate response (Horner et al., 1986a). Once teaching examples have been selected, a sequence for their instructional presentation must be determined. This is an area to which social skills instruction has traditionally paid little attention. However, research suggests that sequencing has a critical effect on the resulting generalized performance (Horner, McDonnell et al., 1986c). Table 3 summarizes recommendations for sequencing teaching examples. Recommendations for Sequencing Teaching Examples 1 Present multiple components of an activity within training sessions. 2 Present multiple examples of an activity within individual training sessions (Do not train one example at a time in an easy-to-hard sequence. 3 Present maximally similar positive and negative examples one right after the other. 4 Use cumulative programming. 5 Teach the general case (basic rule) before teaching exceptions. It is possible to develop a lesson wherein the student would be presented with activities that have a number of similarities, and yet differ significantly. Presenting these multiple examples allows the student to make critical comparisons. For instance, two-square can be used as a training example along with an example of a group playing catch. Both activities occur on the playground, both involve a ball, and both require that players be recognized in order to participate. By utilizing these examples in training the instructor is helping the student to identify conditions in which entering skills are required. At the same time, two-square and catch require different entering approaches. Two-square requires the student to attend to a waiting line and wait before entering whereas the catch activity requires the student to request involvement. This difference can be used to teach the student the difference between waiting-line games and request games. When presenting these initial examples, it is important to provide the general case or most typical types of situations before going on to the exceptions. If Mrs. Mild utilizes two-square games where only two people are playing and no line is present as an exception to the norm then it should only be presented as an example after the skill has been demonstrated with the general case. However, it is not recommended that training proceed along an easy to hard sequence. Rather, Horner, McDonnell et al. (1986c) suggest that the training mix be made up of 60% easy examples, 20% intermediate examples, and 20% hard examples. This allows opportunity for success while providing ample variability to prevent generalization errors. To further the student's discrimination of the limits within which the target behavior is appropriate, negative examples should be immediately juxtaposed. For instance, immediately after presenting the group catch example another example of catch is presented wherein the student should not attempt to enter. One possible example of this might be a group playing in an area set aside for older students or playing in an area that has been designated as off limits for the student. The immediate juxtaposition of the nonexample immediately after the range of positive examples is essential in helping the student to discriminate the critical features of the instructional universe. Training should frequently call on information from past sessions and use it to present new information and build new skills. This cumulative programming not only serves as a review but also helps the students by providing a familiar knowledge base to which they can attach unfamiliar concepts. For instance, the skills learned with two-square examples may be recalled and reviewed before introducing more complex activities such as swinging or merry-go-round, where waiting is similar but no set lines exist. Once examples have been selected and sequenced, instruction is ready to begin. As stated by O'Neill (1990), "general case instruction does not require new or unusual teaching techniques" (p. 122). That is, there is no relevant difference between effective instruction for academic content and that of social behavior. The novelty of GCP compared to traditional instruction lies in teacher assessment and planning as outlined above and in the potential utility to the learner (Horner, McDonnell et al., 1986c). In general, instruction should include what Horner et al. refer to as "the impressive array of techniques related to prompting, fading, shaping, reinforcing, and pacing that are the foundation of quality instruction" (p. 294). In addition, practice with immediate feedback is an essential part of not only learning but also a key to generalization (Radley et al., 2017). When training cannot feasibly occur in the natural environment, simulation training has been found to be a successful strategy of bringing the natural environment to training (Knapczyk, 1989, McDonnell & Horner, 1986c). Simulation training consists of bringing as much as possible of the relevant and irrelevant natural stimuli into the training session, including sounds, smells, and sights. For example, if the natural setting were a playground, simulation training might include a cleared floor area in the classroom, an audio recording of the playground noises (e.g., balls bouncing, whistles, students talking), students in gym clothes, actual bouncing balls, etc. Simulation procedures allow the student to experience much of the variance in stimuli that actually occurs in the natural environment while training. This reduces the likelihood of generalization errors after training. Although a successful strategy by itself, simulation training is most successful when used in conjunction with natural setting training (Horner & Albin, 1988). Once training has been completed, probes (i.e., tests) are instituted to assess problems or errors in responding. In this sense, probes provide information as to the types of errors that are being made. For example, probing may demonstrate that a student is attending to the gender of the activity participants when determining how to enter. This attention to irrelevant stimuli results in response errors. Once this information becomes available to the instructor, it suggests training to remedy the problems (Horner et al., 1984). Testing should occur in the natural environment, using nontrained examples. That is, the goal is to assess the student's ability to perform a skill or variation in novel settings or situations. For example, if we have been training students with two-square and four-square examples, testing with these same examples will prove only that the student has mastered those situations and offers no indication of the student's ability to perform across all such situations. However, if we were to use tether-ball as a probe example we would be better able to make a judgment as to the degree to which the skills had generalized to other, similar situations in the natural environment. Steere et al. (1989) state that "teachers can only be confident that their students have generalized skills if increases in skill level are noted with the non-taught probe examples" (p. 23). It is clear, community-based social skills learned in the classroom are of little consequence to students unless they can be performed across time, settings, contexts, and individuals. To achieve these generalized outcomes, attention must be paid to planning for generalization at each step of training. General case programming provides a structure by which teachers can be certain that a best practice technology for achieving generalized responding is a part of their training procedure. The author(s) received no financial support for the research, authorship, and/or publication of this article. Not applicable This does not meet the "Common Rule" definition of human subjects' research. As such the project did not require IRB review. This case study relied on archival clinical data set. Consent to use this data set was collected from the caregiver. The authors declare that they have no conflict of interest. Not applicable Albin, R. W., Horner, R. H., Koegel, R. L., & Dunlap, G. (Eds.). (1987). Extending competent performance: Applied research on generalization and maintenance. University of Oregon, Specialized Training Program. Behavior Analyst Certification Board (BACB). (2012). Behavior analyst task list (4th ed.). uploads/2020/05/BCBA-BCaBA-task-list-fourth-edition-english.pdf. 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