Comprehensive Review of the Literature to Teach Campus Navigation to Young Adults with Intellectual and Developmental Disabilities

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Young adults with intellectual and developmental disabilities (IDD)experience unique challenges as they transition to living and learning on a college campus, including independent campus navigation. The purpose of this study was to present the results of a comprehensive literature review of interventions designed to improve campus navigation among young adults with IDD. For seven studies that met inclusion criteria, authors presented the (a) purpose; (b) participant demographic information including grade, age, and disability; (c) setting; (d) research design; (e) dependent and independent variables; and (f) results. Results indicated that all studies delivered interventions via handheld electronic devices and all participants improved navigation skills. Finally, authors presented practical considerations of the interventions to support informed instructional decisions among practitioners. Overall, an emerging body of research supports the use of handheld electronic devices to improve navigation of college campuses and surrounding areas among students with IDD.

Keywords: navigation; intellectual and developmental disabilities (IDD); handheld electronic devices, college inclusion programs

In the last five decades, individuals with Intellectual and Developmental Disabilities (IDD) in the United States have largely moved out of institutions and into homes in their communities with varied residential supports, as needed. As a result, many skills that support community inclusion are widely recognized as valuable instructional targets for individuals with IDD. In addition to enhanced community inclusion and participation, young adults with IDD now have opportunities to participate fully in college communities. Currently, 275 inclusive post-secondary education (IPSE) programs provide specialized supports to include young adults with IDD at colleges throughout United States. IPSEs are currently located in 49 states in the United States (Think College, 2019).

Unique Skills Required for Campus Life

College freshmen experience challenges associated with the transition to college life. According to Mental Health America (2016), a non-profit aimed at improving mental wellness among people with and without mental illness, college freshmen commonly encounter problems with organization, time management, budgeting, and interpersonal relationships with roommates. As students with IDD transition to living, learning, and working on college campuses, they are likely to encounter the challenges that all new college students encounter, but also experience unique challenges because of the impact of their disability. For example, students with IDD may experience marked challenges with abstract concepts such as time management, safety, risk, and consequences, which can pose serious challenges on college campuses and community settings. Given the unprecedented and recent opportunity for students with IDD to attend college, researchers have investigated instructional content to diminish barriers to college success such as problem behavior (Lipscomb et al., 2018) and campus navigation, or skills for traveling purposefully from one place to another on a college campus (Smith et al., 2017).

Campus Navigation Research

In a survey of 149 IPSE programs for students with IDD, 40% of programs indicated that they consider applicants' campus navigation skills as an important prerequisite skill for admission to the program (Grigal et al., 2012). Recently, Griffin and Papay (2017) recommended that special education providers teach navigation skills to high school students who intend to transition to an inclusive college program. In the last decade, as students with IDD have participated in college programs, researchers have implemented effective interventions to teach campus navigation skills to bolster students' independence. Consequently, practitioners in IPSE programs should be knowledgeable about how to support campus navigation among students with IDD via research-based practices.

Method

A comprehensive review of the literature was conducted on interventions that taught navigation skills to students with IDD who attended college programs. An electronic database search using Educational Resources Information Center (ERIC), EBSCOhost, MasterFILE Premier, and PsychINFO was conducted. First, search terms included full and truncated forms of *navigation, disability, pedestrian, and post-secondary.* Second, the reference lists of the articles included in this review were analyzed to identify additional articles. Third, the researchers conducted a cited reference search using articles identified in the aforementioned two search procedures.

Inclusion/Exclusion Criteria

Articles included in the review: (a) were published in a peer-reviewed journal from the United States; (b) included participants who participated in educational opportunities on a college campus; and (c) investigated interventions aimed at enhancing navigation skills among youth with IDD. We excluded articles that examined the impact of navigation interventions among students with disabilities who were matriculating in a traditional college program (e.g., Feucht & Holmgren, 2018).

Analysis of Literature

Seven articles met the search criteria. The two authors agreed on the inclusion of all of the articles based on the inclusion criteria. For each article, information was first collected related to the comprehensive literature review, including: (a) authors and date; (b) purpose; (c) participant demographic information including grade, age, and disability; (d) setting; (e) research design; (f) dependent and independent variables; and (g) results. Interrater reliability was conducted by the authors for all of the articles. Reliability was established by adding the total number of agreements and dividing this sum by the total number of possible responses. Reliability for elements included in each study (i.e., a through g, above) was 100%.

Results

Participants

Seven studies met the inclusion criteria. The studies included a total of 27 participants, including 14 females and 13 males who were between the ages of 18 and 26 years old. All participants had an intellectual disability. IQ scores ranged between 41 and 70. Price, Marsh, and Fisher (2018) did not provide an IQ range. Participants were either enrolled in an IPSE program (*n* = 20) on a college campus or enrolled in either a public school transition program located on a college campus (*n* = 3; Mechling & Seid, 2011) or a school to work transition program located on a college campus (*n* = 4; Price et al., 2018). See Table 1 for a summary of the 7 studies.

Design

All studies used a single case research design. Three studies used a multiple probe across participants design, one study used a multiple probe across destinations replicated across students, and two studies used an adapted alternating treatments design. One study used an ABAB reversal design.

Setting

Studies were conducted on both the college campus and the surrounding community where the campus was located. In four of the studies, researchers taught students to navigate the college campus while walking. In one study, researchers taught students to navigate the campus bus (Price et al., 2018). In one study, researchers taught participants to navigate the community near the campus to find businesses that might be hiring (McMahon , Cihak, & Wright, 2015). Yuan, Baling-Langel, & Hua (2019) taught participants in a campus office and probed the participants on finding their way to a campus destination.

Navigation Skills

All studies defined navigation skills differently and measured impacts on different dependent variables; however, all dependent variables were related to participants' abilities to navigate on a college campus or the surrounding community. Kelley et al. (2013) defined navigation skills as correct and independent travel of a route to and from specified locations. A second dependent variable was navigating to and from landmarks using pictures displayed on an iPad. McMahon, Cihak et al. (2015) taught students to walk to local businesses and defined the dependent variable as percentage of navigation checks completed independently. These navigation checks occurred at decision points such as a crosswalk. McMahon, Smith et al. (2015) taught participants to navigate to unfamiliar locations on campus. The dependent variable was defined as percentage of independent direction checks performed by the participant. Mechling and Seid (2011) defined the dependent variable as the number of landmarks and final destinations reached independently. Price et al. (2018) measured participants' ability to use Google Maps to take the bus from a starting location to a destination using a 15-step task analysis. Smith et al. (2017) defined navigation skills as the number of independent way point decisions recorded when traveling to a target novel location. Finally, Yuan et al. (2019) taught participants to plan a route using Google Maps. Each participant was probed on if they could successfully navigate using Google Maps to a destination on campus.

Independent Variable

The researchers used a variety of strategies to increase navigation skills. One study used a PowerPoint presentation depicting digital photographs of campus landmarks that were enhanced with arrows to depict turns in the route, all delivered on video iPods (Kelley et al. 2013).

Two studies used a similar strategy. McMahon and colleagues used three different conditions: a paper map printed from Google Maps, Google Maps displayed on an iPad or iPhone, and augmented reality (AR). McMahon , Cihak et al. (2015) used an app called *Layar* which embedded visual prompts that appeared as an icon of a location when viewed through the camera feature of the mobile device. McMahon, Smith et al. (2015) used an app called *Navigator Heads Up Display* which showed embedded digital information for the target location on a display of the real surroundings (e.g., the location name and remaining distance in feet). Smith et al. (2017) also used AR with the use of the *Heads Up Navigator* mobile application which embeds visual prompts on landmark names when viewed via the camera of an iPhone.

Three studies used task analysis and prompting to increase navigation skills. Mechling and Seid (2011) used task analysis paired with least-to-most self-prompting intervention that included photo prompts, audio prompts, and video prompts delivered on a handheld electronic device, the Cyrano Communicator, which is an augmentative communication device. Price et al. (2018) delivered task-analytic instruction paired with constant time delay (CTD) with verbal and gestural prompts to teach use of Google Maps on a smartphone to follow a bus riding routine. Yuan et al. (2019) used CTD with a model prompt to teach students to plan a route using Google Maps.

Some researchers used an error correction procedure when the student made an error (e.g., went the wrong way at an intersection) during intervention. Kelley et al. (2013) provided assistance either when requested from the student or after 30 seconds without a participant response. Assistance included modeling how to use the back button on the iPod to locate the previous landmark. If a student made an error during navigation, researchers verbally prompted students to use the iPod and return back to the landmark where the error occurred. McMahon, Cihak et al. (2015) periodically checked navigation at intersections, crosswalks, or after 2 minutes of walking. The researchers provided a verbal and gesture prompt after three consecutive errors. McMahon, Smith et al. (2015) asked students to identify the next step in traveling along the route at seven different points. If students responded incorrectly or did not respond after 4 seconds, the researchers implemented a system of least prompts (i.e., verbal and/ or gestural) with a 4-second delay interval between prompts. Smith et al. (2017) also asked students which direction to go at several waypoints on a route. The researchers provided praise if students answered correctly, and implemented a system of least prompts (e.g., verbal, verbal and gesture, and partial physical) with a 4-second delay between prompts if students answered incorrectly. Finally, Yuan et al. (2019) used an error correction procedure in the pedestrian navigation probes. Participants used their planned route on Google Maps to navigate to a destination. During the travel, researchers provided an indirect verbal prompt if a participant stopped for longer than 10 seconds or asked for help, but participants were not stopped if they did not walk in the correct direction of the route.

Results

All studies resulted in increased navigation skills for all of the participants. In two studies, McMahon, Cihak et al. (2015) and McMahon, Smith et al. (2015) compared three intervention conditions: paper-based Google Map, Google Maps displayed on an iPad or iPhone, and AR using an app that embedded visual prompts on a map. All participants showed immediate effects when using the AR app and mixed results with Google Maps on an electronic device. Participants needed additional support to use the paper-based Google Maps.

Two studies collected generalization data on navigating to new locations. Kelley et al. (2013) and Price et al. (2018) had participants travel to new locations using the same procedures as intervention. Six of the eight students were able to navigate to these new locations.

One study included a primary dependent variable of planning a route using Google Maps and a secondary dependent variable of using the route to navigate to a destination on campus (Yuan et al., 2019). Two of the three participants independently completed all steps of route planning after intervention ended while one participant needed additional support to complete all six steps of the task analysis. Additionally, two of the three participants were able to navigate to one location after instruction independently and one participant needed verbal prompts.

Discussion

Researcher groups conducted seven studies using software delivered via handheld electronic devices to improve campus navigation skills among students with IDD. Results indicated that all students improved navigation skills. Overall, an emerging body of research supports the use of handheld electronic devices to improve navigation of college campuses and surrounding areas among students with IDD. Consequently, further consideration of the key elements of these studies is important to guide further research and practice.

Recommendations for Research

Researchers embedded a variety of instructional tools in the seven studies included in this review. In the two earliest studies, researchers developed the intervention by taking photographs and recording other prompts to be delivered via a handheld electronic device (Kelley et al., 2013; Mechling & Seid, 2011). In the remaining five studies, researchers delivered interventions to investigate participants' use of commercially-available tools, including Google Maps (McMahon, Cihak et al., 2015; McMahon, Smith et al., 2015; Price et al., 2018; Yuan et al., 2019). Three studies investigated the use of commercially-available AR tools, including *Heads Up Navigator* (McMahon, Smith, et al., 2015; Smith et al., 2015) and *Layar* (McMahon, Cihak et al., 2015). Two studies (McMahon, Cihak et al., 2015; McMahon, Smith et al., 2015) compared three tools, including a paper-based campus map, Google Maps via a handheld electronic device, and AR tools via handheld electronic device. In both studies, the AR tools [i.e., *Heads Up Navigator* (McMahon, Smith et al., 2015); *Layar* (McMahon, Cihak et al., 2015)] were the most effective, and participants using them required the least person-delivered support. Therefore, further research to determine the most effective commercially available navigation and AR tools is warranted.

Given important advancements in commercially-available navigation technology, researchers should consider investigating intervention conditions that reflect social validity in terms of developing instructional materials and generalization to novel locations. It is notable that the researcher-developed interventions (Kelley et al., 2013 Mechling & Seid, 2011) were designed to support navigation to specific campus locations, and interventions were designed accordingly. Mechling and Sied did not assess generalization; however, Kelley et al. selected an untrained campus location to assess generalization and consequently created a researcher-developed intervention for that one location. Alternately, for those studies that embedded commercially-available navigation tools, these tools supported navigation to novel locations without additional researcher-developed materials. Price et al. (2018) embedded Google Maps in task-analytic instruction and indicated that one participant navigated to seven novel locations.

Further, researchers should determine if participants can navigate to a location using different routes and under different conditions. For example, researchers should determine if students can effectively navigate to intended locations during different levels of pedestrian activity and traffic (e.g., class change on campus) and on different types of campuses (e.g., rural, urban, mountainous, small campus community, large university). Finally, researchers might consider the use of handheld devices for other purposes related to campus engagement and independence among college students with IDD. For example, students might benefit from learning about additional safety features on handheld smartphones such as the embedded flashlight and using the "send my location" feature to communicate with a peer when lost.

Recommendations for Practice

To enhance usability of this analysis among college inclusion practitioners, the authors collected information related to practical elements of the interventions, including: (a) target skills, (b) materials, (c) implementation procedures, and (d) practical considerations, which is presented in Table 2.

First, researchers recommend that practitioners select tools and design interventions to respond to the unique learning needs among learners such as prerequisite technology skills (McMahon, Smith et al., 2015) and fine motor skills (Kelley et al., 2013). Additionally, practitioners teaching navigation skills via handheld devices must take into consideration that the weather can impact the display on the device screen (Mechling & Seid, 2011) and that there are risks associated with use of handheld devices during pedestrian travel overall (Kelley et al., 2013).

Second, practitioners should also consider the learner's preference in selecting navigation tools. Uniquely, McMahon, Cihak et al. (2015) first compared the use of three tools; however, researchers implemented a final phase of the study in which students could use their preferred tool to navigate to locations. All students selected the AR tool (i.e., *Layar*) and maintained mastery of navigation skills in this phase. Further, practitioners should collaborate with assistive technology experts to identify current trends in technology tools that can support independence among learners with IDD.

Third, practitioners should weigh advantages and limitations of the intervention materials and procedures. For the researcher-developed tools (i.e., Kelley et al., 2013; Mechling et al., 2011), the internet was not required to implement the intervention because it was stored electronically on the device; however, to use commercially-available navigation tools (e.g., Google Maps), students' devices must have access to the internet. Additionally, developing original instructional materials such as audio and video prompts (i.e., Kelley et al., 2013; Mechling et al., 2011) might be time-intensive; however, McMahon, Cihak et al. (2015) and Smith et al. (2017) indicated that AR technology requires no preparation other than entering the address for the intended location. Further, in terms of cost, commercially-available navigation apps are frequently available at no cost if supported by advertisements (i.e., "ad-supported") or commonly available for less than $5.00 per user device. Finally, if practitioners use a commercially-available tool, both Yuan et al. (2019) and Price et al. (2018) provided the task analysis used in their respective studies.

In summary, given that each study implemented a single subject research design, consideration of external validity is warranted. However, across seven studies designed to improve campus navigation among participants with IDD, all participants (*n* = 27) demonstrated increased skills, and studies were conducted in several campus settings, which contributes evidence that supports this practice.

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Table 1

Summary of Navigation Intervention Studies

Reference	Purpose	Participants	Setting	Design	Skill (DV)	IV	Results
Kelley, Test, & Cooke (2013)	Investigate effects of using picture prompts displayed through a video iPod on pedestrian navigation among young adults with IDD	4 youth with IDD who attended IPSE program All Caucasian; Age range: 18-26; IQ range: 41-67	Various locations on public university in rural area of southeastern US	Multiple probe across participants	1. Number of correct and independent routes completed to and from specified locations 2. Percentage of correct pictured landmarks reached for each route	Researcher-created Powerpoint presentation with digital photographs of campus landmarks and enhanced with arrows to depict route turns, delivered via video iPods	>All participants demonstrated immediate change in trend and level from baseline to intervention phase across three routes; functional relationship between IV & DV >3 of 4 participants were able to travel to novel, untrained routes using video iPod >IRR collected in 30.1% of sessions across phases; overall mean reliability was 98.6% >PR collected in 55% of sessions; 100% mean reliability
McMahon Cihak, & Wright (2015)	Evaluate use of three different navigation aids on independent navigation of a city among young adults with IDD	4 youth with IDD who attended IPSE program Age range: 20-24 IQ range: 45-64	Community setting; a downtown area in a city of 150,000-250,000 people	Adapted alternating treatments	Percentage of directional checks completed independently	>Paper map condition: Printed-paper map of the campus, produced from Google.com in "standard map view" >Google Maps condition:	>All participants demonstrated immediate change in trend and level from baseline to intervention phase for AR treatment; each participant demonstrated 100% accuracy in AR condition; functional relationship between AR & DV

						Application displayed on iPad or iPhone >AR navigation condition: App, *Layar*, via mobile device, which embedded visual prompts	>Participants demonstrated variable results for Google Maps treatment and weak, mixed, or no results for paper-printed map treatment >IRR collected in 25% of treatment phases; overall mean reliability 97% >PR collected in 25% of sessions; 100% mean reliability
McMahon, Smith, Cihak, Wright, & Gibbons (2015)	Evaluate use of three different navigation aids on navigation skills among young adults with IDD	6 youth with IDD who attended IPSE program Age range: 18-24; IQ range: 48-65	Large public university campus	Adapted alternating treatments	Percentage of independent direction checks	>Paper map condition: Printed-paper map of the campus, produced from Google.com in "standard map view" >Google Maps condition: Application displayed on iPad or iPhone >AR navigation condition: App, *Navigator Heads Up*	>All participants demonstrated immediate change in trend and level from baseline to intervention phase for AR treatment; each participant demonstrated 100% accuracy in AR condition >In Google Maps and paper-printed maps treatments, participants required person-supported prompting >IRR collected in 25% of treatment phases; overall mean reliability 95% across all phases and conditions

						Display, via mobile device, which provided display real surroundings and embedded digital information	>PR collected in 25% of sessions; 100% across all phases and conditions
Mechling & Seid (2011)	Evaluate use of handheld electronic device with picture, auditory, and video prompts as a portable self-prompting device on independent pedestrian travel among youth with moderate IDD	3 youth with IDD who attended a high school transition program on college campus Age range: 20-21 IQ range: 46-57	Large public university campus	Multiple probe across three routes and replicated across participants	Number of landmarks and final destinations reached independently along three routes	Researcher-developed self-prompting navigation intervention including photo, audio, & video prompts delivered via handheld electronic device, the *Cyrano Communicator*	>All participants demonstrated immediate change in trend and level from baseline to intervention phase across three routes; functional relationship between IV & DV >IRR collected in 33.3% of sessions; overall mean reliability 97.7% >PR collected in 33.3% of sessions; overall mean reliability 98.3%
Price, Marsh, & Fisher (2018)	Investigate the impact of instruction to use Google Maps to navigate the public transportation system on independent	4 youth with IDD attending a transition program on a college campus Age range: 17-25	Large public university campus	Multiple probe across participants	Percentage of steps completed in 15-step task analysis to use Google Maps via smartphone to take the bus from a starting	Total task chaining and CTD prompting procedures to teach independent bus travel using Google Maps App	>All participants increased navigation skills; 3 of 4 of participants learned to use the Google Maps app to independently navigate public transportation >Generalization: 3 of 3 participants completed 93% or more steps in novel locations;

	travel among youth with IDD				location to a destination		generalization was not assessed for 1 participant >Interrater reliability collected in 53.5% of data collection sessions; overall mean reliability was 99.7% >PR not provided
Smith, Cihak, Kim, McMahon, & Wright (2017)	Examine the effects of using mobile technology to improve navigation skills among youth with IDD	3 youth who attended IPSE program Age range: 22-25 IQ range: 48-65	Campus of a large Southeastern public university in the US	ABAB reversal design	Number of independent waypoint decisions recorded when traveling to a target novel location	The *Heads Up Navigator* mobile application which embeds visual prompts on landmark names when viewed via the camera of an iPhone	>All participants demonstrated improved navigation to unknown location in treatment condition and immediate change in trend and level from baseline to intervention phase; functional relationship between IV & DV >IRR collected in 50% of training and baseline sessions and at least 50% of intervention and withdrawal sessions; overall mean reliability 97% >PR collected in at least 40% of sessions in each phase; overall mean reliability 95%
Yuan, Baling-Langel, & Hua (2019)	Examine the effects of constant time delay on the acquisition of route planning	3 young adults who attended IPSE program Age range:	Urban, Midwest university; Instruction in private campus	Multiple probe across participants	Primary DV: number of independent steps to plan a route using Google Maps	Constant time delay with 5s delay and model prompt	> 2 of 3 participants independently completed all steps of route planning after intervention ended; 1 participant needed cue card and targeted

	using the Google Maps mobile app	18-20 IQ range: 58-70	office Navigation probes occurred on campus	Pedestrian navigation Probe: successful navigation to location	feedback to complete all 6 steps > 2 of 3 participants were able to navigate to one location after instruction independently; 1 participant needed verbal prompts >IRR collected on at least 66.7% of sessions during each phase; mean reliability for 2 participants was 100% and for one participant was 97.2% >PR collected on 33.3 % of baseline sessions and 80% of instruction and post-instruction sessions; mean reliability 100%

Note. IRR=Inter-rater reliability; PR=Procedural reliability

Table 2.

Practical Elements of Campus Navigation Interventions

Reference	Target Skills	Materials	Implementation Procedures	Practical Considerations
Mechling & Seid (2011)	Campus pedestrian skills to specific locations	Researcher-developed self-prompting system with campus photographs, and audio & video recordings, presented on Cyrano Communicator	1. Create campus photographs, audio and video recordings 2. Create self-prompting system 3. Pre-training for student to use self-prompting system for unrelated tasks 4. Provide student with device programmed with self-prompting system and verbal direction of target location	>Time investment to develop the self-prompting system >Internet not needed >Cyrano Communicator used in this study (approximate cost $1300.00); could develop intervention and depict on other handheld electronic device >Locations taught identified prior to preparing self-prompting system
Kelly, Test, & Cooke (2013)	Campus pedestrian skills to specific locations	Researcher-developed Powerpoint presentation including digital photographs enhanced with digital arrows to depict turns, delivered via video iPod	1. Take digital photographs of campus landmarks 2. Create three Powerpoint presentations, depicting sequenced landmarks on three campus routes 3. Pre-training to teach participants to use video iPods 4. Provide students with Powerpoint presentation on video iPod device	>Time investment to take digital photos and develop presentation >Video iPod used in this study (approximate cost $150.00); could develop intervention and depict intervention on other handheld electronic device >Locations taught identified prior to preparing presentation
McMahon, Cihak, & Wright (2015)	Campus navigation skills to unknown urban locations	>Printed-paper campus map >Google Maps app displayed via iPhone >AR Navigation App, *Layar*,	1. *Download navigation app from internet onto handheld device 2. Pre-training to use *Layar* AR app 3. Program location 4. Provide students with handheld device to navigate to identified	>Navigation Apps are ready for use upon download >Need handheld electronic device, such as iPhone >Mobile device must be connected to internet

		displayed via iPhone	location 5. After 3 incorrect responses, deliver verbal and/or gestural prompting	
McMahon, Smith, Cihak, Wright, & Gibbons (2015)	Campus navigation skills to unknown locations	>Printed-paper campus map >Google Maps app displayed via iPhone or iPad >AR Navigation App, *Navigator Heads Up Display*, displayed via iPhone or iPad	1. *Download navigation app from internet onto handheld device 2. Pre-training to use *Navigator Heads Up Display* AR app 3. Program location 4. Provide students with handheld device to navigate to identified location 5. Use system of least prompts for incorrect or no response	>Navigation Apps are ready for use upon download >Mobile device must be connected to internet >Need handheld electronic device, such as iPhone
Smith, Cihak, Kim, McMahon, & Wright (2017)	Campus navigation skills to unknown locations	>AR Navigation App, *Heads Up Navigator,* displayed via iPhone or iPad	1. Download navigation app from internet onto handheld device 2. Pre-training to teach participants to use *Heads Up Navigator* via Model-Lead-Test & Least to most prompting procedures 3. Program location 4. Provide students with handheld device to navigate to identified location 5. Use system of least prompts for incorrect or no response	>Navigation Apps are ready for use upon download >Need handheld electronic device, such as iPhone >Mobile device must be connected to internet
Price, Marsh, & Fisher (2018)	Public transportation to campus locations	>Researcher-created 15-step task analysis of bus travel	1. Use available task analysis for bus travel routine or adapt 2. Pre-training of visual cues embedded in Google Maps	>Time investment to develop task analysis >Navigation Apps are ready for use upon download

		routine integrating >Google Maps app presented via handheld device	3. Teach task analysis use of Google Maps via total task chaining and CTD prompting procedures 4. Participants travel alone & meet participant at location.	>Need handheld electronic device, such as iPhone >Mobile device must be connected to internet
Yuan, Balint-Langel, & Hua (2019)	Entering address in Google Maps via handheld device	>Researcher-created cue card depicting 6-step task analysis of entering an address into Google Maps >Google Maps app presented via handheld device	1. Provide students with cue card depicting task analysis and handheld device 2. Teach task analysis use of Google Maps via total task and CTD prompting procedures 3. Assess functional use of task analysis to access locations on campus	>Navigation Apps are ready for use upon download >Need handheld electronic device, such as iPhone or Android phone >Mobile device must be connected to internet

*Implementation procedures are identified for most effective treatment in studies that compared navigation intervention