International Journal of Disability, Development and Education

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cijd20

Development of the Goal-Setting Challenge App: Engaging Users to Promote Self-Determination

Valerie L. Mazzotti, Karrie Shogren, Jared Stewart-Ginsburg, Danielle Wysenski, Kathryn Burke & Lisa Hildebrandt

To cite this article: Valerie L. Mazzotti, Karrie Shogren, Jared Stewart-Ginsburg, Danielle Wysenski, Kathryn Burke & Lisa Hildebrandt (2022) Development of the Goal-Setting Challenge App: Engaging Users to Promote Self-Determination, International Journal of Disability, Development and Education, 69:1, 331-351, DOI: 10.1080/1034912X.2021.1959022

To link to this article: https://doi.org/10.1080/1034912X.2021.1959022

Published online: 29 Jul 2021.

INTERNATIONAL JOURNAL OF DISABILITY, DEVELOPMENT AND EDUCATION
2022, VOL. 69, NO. 1, 331–351
https://doi.org/10.1080/1034912X.2021.1959022

Routledge
Taylor & Francis Group

Development of the Goal-Setting Challenge App: Engaging Users to Promote Self-Determination

Valerie L. Mazzotti [a], Karrie Shogren [b], Jared Stewart-Ginsburg [a], Danielle Wysenski [a], Kathryn Burke [c] and Lisa Hildebrandt [b]

[a]Special Education and Child Development, University of North Carolina, Ringgold Standard Institution, North Carolina, United States; [b]Department of Special Education, Kansas University Center on Developmental Disabilities, Kansas, United States; [c]Department of Teaching and Learning, Temple University, Pennsylvania, United States

ABSTRACT

To promote and enhance self-determination, the Self-Determined Learning Model of Instruction (SDLMI) was developed for teachers to teach students the skills needed to engage in goal-directed actions. The SDLMI was originally designed to be delivered by teachers, but technologies are emerging that can provide an alternative medium to delivering instructional content and promoting individualised learning experiences. This study: (a) describes the iterative development of the Goal-Setting Challenge (GSC) App, which 'translates' the SDLMI into a web-based platform; and (b) shares findings from focus groups with students and teachers to support student engagement with the App with a focus on usability and feasibility. The first phase of an iterative multi-year project to develop the GSC App for students with disabilities is described. Two themes (motivation and engagement, modifications and accessibility) emerged from participant focus groups and informed iterative development. Limitations and implications for future research and practice are discussed.

KEYWORDS

Goal setting; secondary transition; self-determination ; technology; youth with disabilities

Introduction

The importance of promoting and enhancing self-determination has been widely acknowledged in the disability field (Shogren et al., 2015; Test et al., 2009). Researchers have established a relationship between enhanced self-determination and in-school and post-school outcomes for students with a wide range of disability labels and support needs (Mazzotti et al., 2021). For example, researchers have established that when students with disabilities are taught self-determination skills in secondary education and transition planning, they show enhancements in self-determination and goal attainment in school (Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2013). Also, these youth often experience more positive post-school employment, community participation, and postsecondary education outcomes (Newman & Madaus, 2015; Shogren et al., 2015; Wei, Wagner, Hudson, Yu, & Javitz, 2016).

CONTACT Valerie L. Mazzotti vlmazzot@uncc.edu

While various frameworks for understanding self-determination have been introduced over the past 30 years, Causal Agency Theory (Shogren et al., 2015) was recently introduced to integrate previous frameworks, incorporate emerging knowledge in disability and psychology, and provide a framework to understand self-determination and ways to support its development. Causal Agency Theory focuses on how to teach skills, create opportunities, and build systems of supports for people with (and without) disabilities to become causal agents over their lives; that is, people who make things happen in their lives. As such, Causal Agency Theory provides a framework for intervention and assessment approaches that are currently being developed and implemented in research and practice in secondary transition. For example, the Self-Determined Learning Model of Instruction (SDLMI; Shogren, Raley, Burke, & Wehmeyer, 2018) is aligned with Causal Agency Theory as it focuses on how to enable teachers to support students to develop self-regulated problem solving skills as they work towards goals, building their causal agency and self-determination abilities. The SDLMI was developed to be a model of instruction that could be used by teachers to (a) change the focus of goal setting and attainment instruction from teacher-directed to student-directed and (b) teach students the skills needed to engage in goal-directed actions currently and in the future (Shogren et al., 2018). A growing body of research has examined the impact of the SDLMI on student and teacher outcomes and has consistently suggested the SDLMI has a positive impact on teacher practices, student self-determination, and in-school and post-school goal attainment (e.g. Hagiwara, Shogren, & Leko, 2017).

However, as noted, the SDLMI was originally designed to be delivered by teachers (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000), but increasingly, technologies have emerged that can provide not only an alternative medium to deliver instructional content, but also promote more personalised and individualised learning experiences (Office of Education Technology, 2017). Technology as an alternative medium may be highly important as students are working to set and attain education- and transition-related goals. As such, there is a need to develop and evaluate technology-based solutions for teaching self-determination skills through the SDLMI, potentially enabling greater student self-direction and personalisation (Fitzgerald, Koury, & Mitchem, 2008), as well as enabling teachers to move into a supportive role focused on reinforcing content related to the SDLMI throughout the school day rather than delivering instruction (Mazzotti, Test, & Wood, 2013).

To address this need, we conceptualised the Goal-Setting Challenge (GSC) App, which takes the SDLMI framework and 'translates' it into a web-based platform that promotes greater student engagement and self-direction in the SDLMI process. As mentioned, the SDLMI was designed to be delivered by teachers (or other trained SDLMI facilitators), and comprehensive instructional materials have been developed to enable teachers to embed SDLMI content into general education classrooms, special education supports, and transition planning. The SDLMI includes a series of 12 *Student Questions*, that are linked to *Teacher Objectives* and *Educational Supports*. The 12 *Student Questions* are organised into three phases (Phase 1 – Set a Goal; Phase 2 – Take Action; Phase 3 – Evaluate Progress). Essentially, during each phase the student learns a series of steps based on the self-regulated problem solving literature to solve a problem. For example, during Phase 1, the problem is, 'What is my goal?' The *Teacher Objectives* provide the teacher or trained SDLMI facilitator with instructional objectives to target in enabling the student to answer each

question, and the *Educational Supports* are the instructional strategies that may be needed by students to be able to meet the Teacher Objectives and effectively answer the Student Question. The ultimate goal is that the student learn the series of questions and use them in a self-directed manner to work through the goal setting and attainment process on a repeated basis; however, students need supports to learn the process, and over time, to work through increasingly complex goals and barriers that they encounter in setting and working towards goals.

Therefore, in developing the GSC App, the intent was to develop separate lessons or units organised around the 12 Student Questions in a format that enabled the Teacher Objectives to be achieved, but rather than the teacher organising and delivering instruction, instructional technology was used as the delivery medium. In conceptualising the GSC App, we utilised the process model of engagement framework (O'Brien & Cairns, 2016; O'Brien & Toms, 2008) and principles of instructional design (Coyne, Kame'nui, & Carnine, 2011). O'Brien and Toms (2008) defined engagement as 'a quality of user experiences with technology that is characterised by challenge, aesthetic and sensory appeal, feedback, novelty, interactivity, perceived control and time, awareness, motivation, interest, and affect' (p. 949). The process model of engagement framework indicates a user interface must present new or 'aesthetically pleasing' information to gain interest and motivation from the user that allows the user to feel connected to the system and the technology (O'Brien & Cairns, 2016; O'Brien & Toms, 2008). To promote engagement, we conceptualised interactive features to maintain user attention and appropriate, timely feedback embedded within the interface of the web application in initial wireframes (simulated screen-shot of a page of the App) and lesson prototypes. Specifically, we worked to take the existing context developed for teachers to use in implementing the SDLMI (Shogren et al., 2018) and adapted it, in collaboration with our web development partner, to be potentially appropriate for a student-directed, technology-mediated format.

We used principles of instructional design (i.e. model-lead-test format) in development to allow sufficient scaffolding of information to help users organise and activate knowledge, while sustaining high engagement (Coyne et al., 2011). The GSC App wireframes and prototypes were developed with a focus on interactive content using a variety of instructional modes, including voice-over audio dialog, speech recognition features, reading materials, and data visualisations, to support learning needs of students. Further, a back-end was conceptualised so teachers can see at the student- and class-level the degree to which students are completing lessons and taking steps on their plans, providing information necessary for teachers to personalise the supports they provide when students are not engaged with the content in the App to enable generalisation to other learning activities throughout the school day.

While the initial wireframes and prototypes were informed by existing SDLMI materials developed in collaboration with teachers and students across multiple research projects (see Hagiwara et al., 2017), we also wanted to ensure the voices of end-users informed development activities. Therefore, after establishing this base of features and content, we sought feedback from end-users (students) and teachers that would support student use to inform further development for multiple important reasons. First, there is limited focus on self-directed goal setting via technology across disability populations, and while this has been identified as a critical need, it is also necessary to ensure the perspectives of adolescents shape the design process, given the criticality of the user experience to technology design,

engagement, and adoption. Second, it is necessary to determine if materials designed for delivery in a classroom via traditional instruction modes translate well to a technology-mediated format, and end-users are the best sources of information on the feasibility. Third, research has consistently suggested the benefit of ongoing exposure to self-determination skills, namely, repeated opportunities to learn and apply the skills needed to become more self-determined and impact academic, behaviour, and transition outcomes Shogren et al., 2020). As such, delivering instruction via technology with individualised supports and pacing would potentially allow students to move through content at their own pace, with checks for learning and prompts for generalisation delivered by teachers. This is potentially a more useful way to conceptualise self-determination instruction, given the fact that one of the most frequently identified barriers to self-determination instruction is time, particularly to individualise to student needs (Cho, Wehmeyer, & Kingston, 2011); however, feedback from end-users is needed.

Therefore, the purpose of the present study, which is part of a larger body of work on the development, pilot testing, feasibility, and impact on outcomes of the GSC App, was to share findings from focus groups with students with disabilities as end-users and school staff that would support students in engaging with the GSC App on usability and feasibility of the GSC App. Specific research questions included: (a) What content, supports, and accommodations did students and their teachers identify as important to support engagement and access to the GSC App by youth with disabilities?; (b) What features of the GSC App do end-users (i.e. youth with disabilities) prefer to engage with and what features have the potential to promote engagement as designed?; and (c) What do youth with disabilities and teachers believe are essential content elements for implementing the GSC App in school contexts with youth with disabilities?

Method

Participants

Prior to data collection, researchers obtained Institutional Review Board (IRB) approval and written consent and/or assent from teachers, parents, and students indicating willingness to participate in the study. Following IRB approval, the co-Principal Investigator (co-PI; first author) utilised personal contacts (i.e. director of urban private school, rural district director of special education) to recruit diverse teacher and student focus group participants. Participants included 18 transition-age students with disabilities and 14 secondary teachers who worked with students with disabilities. Students and teachers participated in repeated focus groups throughout the design and development activities. Students met the following inclusion criteria for participation: (a) transition-age (i.e. between the ages of 14 and 21), high school students with a disability; and (b) parent/guardian consent and student assent obtained. Teachers met the following inclusion criteria for participation: (a) high school teachers or paraprofessionals supporting students with disabilities; and (b) consent obtained.

Student Participants

Students ranged in age from 15 to 19 (M = 16.8) and included six females and 12 males. Fifteen students were White, two were Black, and one was Latinx. Student disability categories were autism spectrum disorder (n = 6), intellectual disability (n = 4), other health impairment (n = 3), specific learning disability (n = 2), intellectual disability/other health impairment (n = 2), and autism spectrum disorder/intellectual disability (n = 1).

Teacher Participants

Teacher participants included 10 special education teachers, three paraprofessionals, and one transition coordinator. Participants ranged in age from 26 to 55 and included 11 females and three males. Years of experience ranged between three years and 35 years (M = 13.79 years). Eleven were White, and three were Black. Eleven of the teachers participants worked in an urban school district at a private, non-profit secondary school for students with disabilities and were either special education classroom lead teachers (n = 8) or paraprofessionals (n = 3). Two secondary teachers worked in a rural school district at a public high school. Of these two teachers, one served as a special education resource teacher supporting students with disabilities in inclusive settings, and one taught in the Occupational Course of Study Program and also served students with disabilities in inclusive settings. Finally, one district-level transition coordinator participated from the rural school district.

Setting

The study took place in urban and rural settings in the Southeast United States. Focus groups and user testing were conducted in three separate locations, including: (a) a private, non-profit secondary school for students with disabilities in an urban school district; (b) a public high school in a rural school district; and (c) the central office in a rural school district. The private, non-profit secondary school provided instruction to middle and high school students with disabilities targeting a functional and career approach to their education. The school's student population was 42% female and 57% male with 33% minority enrolment. At the private school, teacher and student focus groups and user testing took place in two classrooms. Student focus groups and user testing were conducted during the first period of the day. Teacher focus groups and user testing were conducted either before school or during weekly after-school staff meetings.

Additional focus groups and user testing took place at a public, rural high school (students) and the district's central office (a transition coordinator and two special education teachers). The school district was classified as rural and served approximately 16,000 students. The public high school's student population included 26% minority enrolment, 53% economically disadvantaged, and 12% with disabilities. Student focus groups and user testing were conducted in a resource room and an Occupational Course of Study class during the second period. Teacher focus groups and user testing were conducted in a meeting room at the district's central office after school. All focus groups and user testing took place in classrooms free of distraction for participants.

Research and Web Development Teams

Researchers from two universities (one in the Midwest and one in the Southeast United States) are implementing this project (as part of a larger body of work). For this study, three researchers from the university in the Southeast United States led focus groups and user testing and collected all qualitative data. The first researcher (first author) was an Associate Professor of Special Education and co-PI on the project with expertise in secondary transition with an emphasis on self-determination skill development for students with disabilities. The second researcher (third author) and third researcher (fourth author) were doctoral students and Graduate Research Assistants on the project. Each researcher documented, submitted, and reviewed researcher bias statements to clarify their personal biases in the coding process and engaged in reflexivity (Trainor & Graue, 2014).

The research team at the Midwest university provided support in interpreting focus group and user testing data and integrating these data into the ongoing development of the GSC App, given their expertise on the SDLMI and its development and implementation. The first researcher (second author, PI on overall project) has led development of the SDLMI and its implementation in multiple research projects with diverse student populations. The other team members from the Midwest university site (fifth and sixth authors) led activities related to working with the web development team to address focus group and user testing feedback and ensure full alignment of all wireframes and lesson prototypes with SDLMI content.

The web development team was located in the Pacific Northwest and had expertise in full-service software development, including design and development of rich web and mobile applications and data collection/reporting solutions. Additionally, the team had extensive experience developing online educational experiences and research support tools. The web development team worked with the research teams to ensure best practices in development and to integrate end-user feedback throughout the iterative development process (described subsequently), ultimately leading to fully developed, interactive SDLMI lessons delivered via the GSC App informed by focus groups and user testing.

Qualitative Research Design

We adopted an action research framework, wherein the action researcher 'brings ideas for practice to fieldwork to have an impact on setting and participants while collecting data' (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005, p. 197). With action research, participants are directly involved in each stage of research, or in this case the design and development process for the GSC App. For the purposes of this study, this direct involvement occurred as (a) researchers collected ongoing, repeated data from participants, (b) participants remained actively involved in providing ongoing feedback at each stage of the design and development process using previously acquired knowledge of the App and its development, and (c) participants' feedback was iteratively used to shape all ongoing research and development activities for the GSC App.

Procedures

Student and teacher focus groups took place over a nine-month period. A total of 16 focus group and user testing sessions were conducted. The same set of students and teachers

participated at each stage of the focus group process. Focus groups were organised around three key phases of the design and development process for the GSC App: (a) wireframes – a simulated screenshot of what the student user's experience would resemble (Leinonen, Keune, Veermans, & Toikkanen, 2016); (b) interface mockups – concrete visual representations of the App that had limited functionality, but highlighted key features; and (c) staged lessons – functional versions of lessons in the App that were used to test features. Feedback from focus groups at each stage was used iteratively by the researchers and web development team to make design and content decisions and determine if the SDLMI was being 'translated' effectively into a web-based platform.

In addition, the SDLMI Teacher's Guide (Shogren et al., 2018), computer-assisted SDLMI materials (Mazzotti et al., 2013), SDLMI instructional materials (e.g. PowerPoints, worksheets) developed to enable teachers to embed SDLMI content into general education classrooms (Shogren & Burke, 2019; Shogren, Raley, & Burke, 2019), and Web Content Accessibility Guidelines 2.0 (Web Content Accessibility Guidelines 2.0. (WCAG, 2019) were used as resources to support GSC App lesson development. Lesson development, in addition to feedback from end-users, also included researchers creating draft lessons using Microsoft Office PowerPoint©, which were sent to the web development team for production document development. Production documents provided a vehicle for the researchers and web development team to communicate back and forth and integrate feedback from focus groups when moving from wireframes to mockups to staged lessons. The staged lessons were housed on Heroku©, a cloud-based domain hosting website for building, running, and operating applications in the cloud, which provided the platform for students and teachers to engage in the third stage of focus groups. We met with the web development team virtually on a bi-weekly basis to: (a) share ongoing feedback from focus groups to support iterative development; (b) discuss options for GSC App development related to design, content, and accessibility; and (c) receive updates on the design and development of the GSC App lessons. Within 10 days of each focus group session, findings were presented via a design summary to the web development team. Summaries were based on transcripts and notes taken during focus group sessions.

Iterative GSC App Development

The purpose of the iterative development focus group phase was to provide authentic guidance on the GSC App design and development. To do this, we elicited ongoing feedback from students and teachers on the essential content, supports, accessibility, and features of the GSC App.

Nominal Group Technique: Wireframes

The iterative design and development process began by conducting three nominal group technique (NGT; Tague, 2004) focus groups (i.e. one with private school students, one with private school teachers, one with public school teachers) to gain feedback on wireframes. The purpose of these focus groups were to (a) establish a common understanding of project goals, (b) clarify expectations for teachers and students, (c) provide an overview of the NGT process, and (d) review wireframes. The first NGT focus group was held with teachers at the private school. During this session, teachers were randomly assigned to

two equally sized groups to facilitate participation. The second NGT focus group was held with students at the private school during which students participated as one group. The third NGT focus group was held with three teachers from the public school.

The NGT procedures included reviewing wireframes with students and teachers to gain initial ideas about the user experience and functionality of the App. NGT sessions included discussion about content, supports, and accessibility considerations for students with disabilities (i.e. end-users), including essential features and options to promote student engagement and a positive user experience. Discussion also focused on design ideas for student avatars (how the students themselves would be represented in the App), as well as how student characters, serving as 'instructors' delivering content in the App, would be represented. Specific to teachers, wireframes of the administrative site were reviewed, and input was gathered about data teachers would need to monitor student progress on goals and action plans, progression through the App, and responses to questions within each lesson. Wireframes were a useful tool for stimulating conversations and demonstrated the visual aspects of the GSC App, including layout, navigation, and user interface elements (Leinonen et al., 2016).

During NGT sessions, researchers presented purposefully selected questions visually via Microsoft Powerpoint© and asked participants to respond orally. Table 1 includes student and teacher questions related to the NGT focus groups. Participants brainstormed ideas individually on colour-coded sticky notes corresponding to the guiding questions. After participants recorded individual responses, participants shared responses with the group and placed answers on chart paper. After discussion of all responses, each group, facilitated by researchers, categorised answers into common themes. After themes were established, groups discussed responses and provided a name and definition for each category. Next, groups prioritised themes by placing dots to vote for the three highest priorities within each category. Groups discussed categories and definitions. Researchers

Table 1. NGT and semi-structured interviews for iterative GSC app development.

Nominal Group Technique	
Student	What is your favourite app and what do you like about it?
	What about an app makes you want to use the app?
	What makes you feel frustrated about using an app?
	If you used an app for school, what would you want it to look like?
	What do you like or not like about the student characters?
Teacher Questions	What would you identify as essential content knowledge needed to ensure accessibility and use by youth with disabilities?
	What would you identify as essential delivery modes within the GSC App lessons to ensure accessibility of content and use by youth with disabilities?
	What features would support student engagement in an interactive app?
	What options do teachers need on the backend to ensure student progress, goal setting, and action planning can be monitored through the app?
Semi-Structured Interviews	
Student questions	What do you like about the updated App?
	What features of the lesson do you like?
	What do you like or do you not like about the new student characters?
Teacher questions	After reviewing the interface mockups, what suggestions do you have to further improve the GSC App design?
	What features of the lesson do you like?
	What suggestions do you have for content design
	Based on the updated student characters, what additional suggestions do you have for improvement?

facilitated discussion and probed for additional insight related to participant responses. Group discussion resulted in consensus on one master list of prioritised responses for each question. NGT focus groups were audio recorded, transcribed, coded, and triangulated using field notes researchers recorded during each session. Outcomes of NGT focus groups were summarised and reviewed with the web development team to further inform the next iteration of the GSC App content in preparation for the mockups to be reviewed during the first phase of semi-structured interviews with students and teachers.

Semi-Structured Interviews: Mockups

Following the NGT focus groups, our iterative process continued with five semi-structured interviews with the teachers and students. The interface mockups used during these interviews incorporated feedback from the NGT focus groups and allowed our team to gain additional information and elicit feedback on the newly developed interface mockups. During these interviews, the focus shifted to user experience with an emphasis on visual aspects of design including colour choice, fonts types and sizes, and general 'look-and-feel' elements of the GSC App lessons. At these sessions, researchers (a) reiterated a common understanding of project goals, (b) provided an overview of the semi-structured interview procedures with clear description of how the process would be conducted, (c) reviewed the interface mockups, and (d) facilitated discussion and probed for additional insight related to participant responses. Researchers facilitated discussion via purposefully selected questions designed to elicit feedback on the interface mockups. Table 1 includes student and teacher questions related to the semi-structured interviews. When reviewing interface mockups, researchers first reviewed design changes and updates made based on outcomes of previous NGT focus groups. Then, researchers presented questions visually via Microsoft Powerpoint© and asked participants to respond orally. Researchers orally asked impromptu follow-up questions to clarify participant feedback as necessary. Semi-structured interviews were audio recorded, transcribed, coded, and triangulated using field notes researchers recorded during each session. At the end of each focus group, researchers collected brainstorming materials, chart paper, and recordings for data analysis. Feedback was then summarised and shared with the web development team using procedures described previously and informed development of the initial staged lessons (i.e. interactive prototypes) for user testing. The interactive prototypes had full functionality, except for administrative features.

User Testing to Support Iterative Design and Development

We conducted user testing as Lessons 1 through 3 were developed, updated, and staged. Lessons were staged on Heroku©. During user testing, participants were instructed to complete a designated lesson (i.e. Lesson 1, Lessons 1 and 2, Lessons 1, 2, and 3) on their own and follow all on-screen directions and prompts. We assisted participants by answering questions about directions in the lessons and recorded a frequency count of requests for assistance as well as notes on the type of assistance participants requested (e.g. repeating directions in the App, showing where to click on the screen). User testing was completed on desktop and laptop computers that ran Windows© 10 operating system and Google Chrome© browser to ensure fidelity of graphics and multimedia content.

Semi-Structured Interviews

Eight focus groups using the semi-structured interview process were conducted for user testing with the interactive prototypes for the first three lessons. After all participants completed staged lessons, researchers gathered participant feedback and perceptions of their user experience, including information about distinct features of the GSC App lessons they enjoyed. User testing focus groups were audio recorded, transcribed, coded, and triangulated using field notes researchers recorded during each session. Feedback based on user testing further informed the ongoing design and development of the remaining GSC App lessons in preparation for moving to a fully functioning prototype for larger-scale piloting.

Data Analysis

From the perspective of an action researcher via an iterative design and development process, qualitative thematic analysis was used to code and segregate data thematically to categorise, synthesise, and interpret information obtained from focus groups (Glesne, 2006). The iterative process provided an opportunity to analyse data within and across project phases. Data analysis informed ongoing design and development of the App. Focus groups were audio recorded, transcribed, and triple-coded by three members of the research team (i.e. first author, third author, fourth author). Further, the third author used a codifying method (Saldaña, 2013) to create a draft of categories and codes to identify themes and feedback components provided by participants. To generate the initial codebook (see Figure 1), we organised initial results by NGT and semi-structured interview questions and identified recurring categories of feedback through a syntactical structure (e.g. 'I think it should . . . ' [or similar phrasing] were coded as suggestions, 'I like that it . . . ' [or similar phrasing] were coded as positive feedback).

Finally, the initial codebook was shared with the full Southeast research team, who provided feedback and compared categories, themes, and descriptors of field notes and transcriptions. We incorporated this feedback to create a final codebook. We used the codebook to analyse all focus group data and identify themes and points of feedback to share with the Midwest research team and web development team. We manually coded transcripts and notes and discussed identified themes until consensus was reached.

Results

Focus groups and user testing were conducted to provide authentic guidance on the ongoing, iterative development of the GSC App. This allowed us to gain information on essential content, supports, accessibility, and features. Sixteen focus groups were conducted using NGT (Tague, 2004) and semi-structured interviews (Wengraf, 2001). Two key themes emerged from participant focus groups and informed the iterative development of the App.

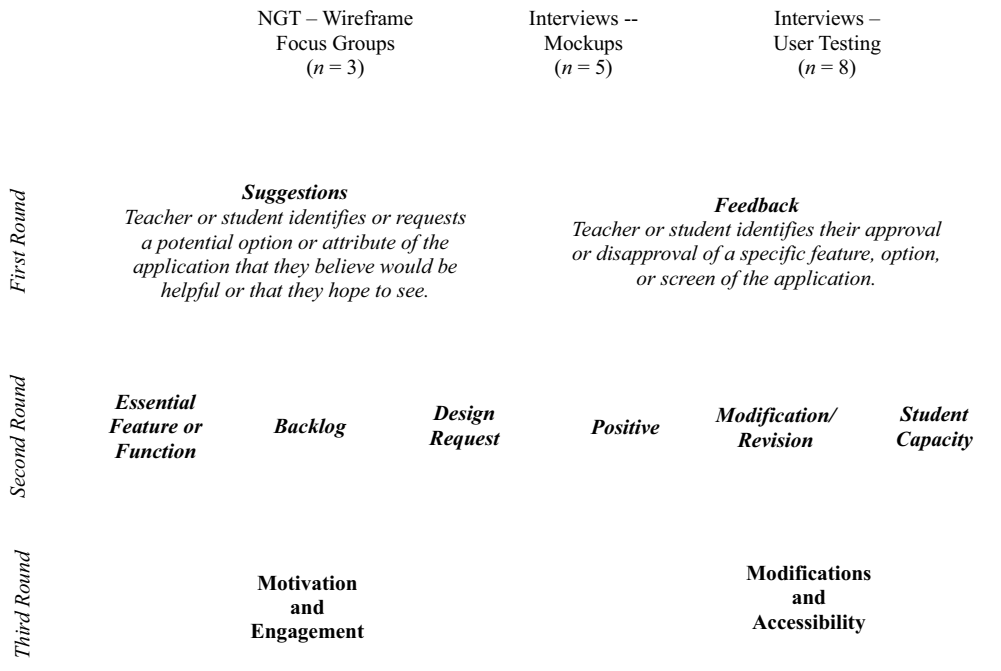

Figure 1. Coding book diagram to conceptualise themes.

Iterative GSC App Development

Nominal Group Technique

Results from the three NGT focus group sessions led to the emergence of two key themes (motivation and engagement, modifications and accessibility) focused on content, supports, and accessibility considerations for the GSC App for students with disabilities as end-users. Students identified several elements as essential content knowledge for the App that supported the motivation and engagement theme. Students maintained the App should be easy to follow and use, provide opportunities to interact with student and teacher characters who delivered content within the App, and contain engaging sensory elements (e.g. bright colours, background music). Students shared a desire for the App to provide customisable features that students could control, such as choosing hair colour or glasses for their avatar. We delineate between avatars and characters in that avatars refer to virtual representations of end-users, and characters refer to virtual actors (i.e. students, teacher) providing instruction in the App (Bailenson et al., 2008).

Teacher feedback echoed the motivation and engagement theme, and also reflected the modifications and accessibility theme that emerged. Teachers suggested options for motivation and engagement features to increase student interest in the App, such as (a) providing students the ability to design an avatar to represent themselves, (b) including a token reward system to allow students to earn rewards within the App, and (c) having a bright and engaging colour scheme. Teachers also emphasised that all content should be accessible for students. This included the ability for students to both see and hear all words on the screen as the content was moved from the wireframes to the online, interactive interface, and the App should provide explicit instruction on how to (a) use

the App and (b) set a goal. Teachers stated they believed students would enjoy the App more if there were clear navigation options, including multiple options for recording responses (i.e. type, speech-to-text).

Feedback from the NGT focus groups was incorporated into the ongoing design and development of the GSC App, particularly the movement from wireframes to the first lesson mockups. Although as noted throughout this section and in the Discussion, balance was needed between what was identified by students and teachers and what was feasible with technology and in alignment with the SDLMI framework. Key issues that emerged and were incorporated into the mockups for ongoing iterative feedback included navigation features (e.g. *next* button, *My Account* page), accessibility options (i.e. text input, audio recording, speech-to-text), graphics and interactive elements, and options for the use of student avatars within the App.

Backend and Administrative Features

Teachers provided insight on the control and administrative features included in the wireframe documents. Teachers requested the ability to add and/or control goals for each student and the ability to edit or modify action plans within the App. Teachers also communicated: (a) the need for usage statistics (e.g. which lessons students were currently working on); (b) how many questions students answered within each lesson; (c) how long students spent in each lesson; and (d) the option to view student answers to all questions across lessons. For example, one teacher's response was: 'It would be great if we could record their [student] response to checks for understanding and use it in our gradebook.' Another teacher added, 'I would love to have their answers to use in writing IEP [individualised education programme] goals.'

Semi-Structured Interviews

Feedback from Interface Mockups

Findings from the five semi-structured interview sessions focused on the lesson interface mockups aligned with the key themes and suggested a strong interest in character features from both students and teachers. First, students offered suggestions for avatar and character features – both related to how their avatar would be displayed in the App (e.g. 'Could you make it so my avatar has braids or a bun?', 'Can my avatar have muscles?'), as well as the characters (i.e. teachers, students) that would be delivering instruction within the App. This feedback suggested that it was of high interest and importance that a range of features and characteristics be used or available (if creating one's own avatar) to represent student diversity. Students indicated they wanted to be able to 'see' someone who looked like them on the screen (e.g. hair colour and style, eye shape, height, clothing style) and wanted as much customisation and variation for characters as possible. This shaped our decision to have students use a picture (that can be taken through the App or uploaded through the system) for themselves as they review their goals or actions in the App rather than an avatar, but to focus on instructional characters (i.e. teacher, students) that represented the diversity present in society (Christopoulos, Conrad, & Shukla, 2018).

Students also identified suggestions related to the design of the App, including varying background colour and design and more features that promote engagement. For

example, they highlighted that they wanted a more enthusiastic teacher voice (e.g. 'She sounds boring!'). Finally, students suggested that they wanted the lessons to be student-driven: 'Can we hear from the students [characters] more often?' and 'Yeah, I would like hearing from students [characters]!' To address this feedback as we moved from mockups to staged lessons, we engaged in significant restructuring to utilise student characters to review lesson content in more places throughout each lesson in addition to the teacher character providing content instruction. In initial lesson designs, the teacher character presented content for approximately 90% of the lesson. We also increased the number of goal setting and action planning examples by student characters to provide more illustrations of student perspectives. In the staged lessons, student characters spoke for approximately 40% to 50% of each lesson.

In terms of teachers, the motivation and engagement theme was evident from the perspectives conveyed about the interface mockups. Teachers felt the App could engage students, and the aesthetic was appropriate for high school students with disabilities. They offered positive feedback on the 'modern look' of the App, such as attire of student characters. Teachers also said, 'I love the hoodies, and one is sitting cross-legged. Our students will relate to these characters.' However, they expressed concerns about the lack of diversity in the student characters and suggested a need for greater diversity of facial features and skin tones that would allow students, as end-users, to more closely identify with the characters. This informed our ongoing work, as noted previously, to promote diversity in the student characters used to deliver instructional content. We reviewed best practices in doing so and worked with the web development team to expand their focus on this area during the next stage of development.

Teachers noted that students having the ability to develop and customise their own avatar could distract from the lesson content and suggested students only have access to customisation features at pre-set times throughout the lessons (i.e. at the beginning, after each phase). Also, teachers encouraged, if students were to be able to select their own avatar, more accessory options (e.g. hair styles and colours, glasses, hats) for students to select from within the App. As noted previously, these themes along with feedback from students, led to our decision for students to represent themselves using a picture both to differentiate themselves from the student characters, as well as to ensure that students felt strongly connected to the content as they set goals and worked through the GSC App.

Related to modifications and accessibility, teachers felt that engagement with the App would be strong for students because of the positive feedback that was provided (e.g. sounds and other interactive elements when answering questions). Additionally, teachers felt the App looked intuitive and easy to use, another key issue related to the theme of modifications and accessibility. One teacher remarked, 'The App gives simple directions that students can follow.' Teachers offered language revisions for phrases and words used in the App to ensure language was accessible and familiar to students. For example, they suggested the use of 'educational goal' instead of 'academic goal' because students would be familiar with this wording because they hear it as part of their IEP [individualised education program]." Teachers also recommended the App pair icons with text as much as possible to provide additional support to ensure lessons do not rely too heavily on written language and provide for multiple means of engagement, consistent with Universal Design for Learning (UDL; CAST, 2018). In addition, several suggestions were provided on supports to facilitate student comprehension, including the inclusion of

a dictionary feature to allow students to click on unfamiliar words and see definitions and synonyms. They also recommended adding a button students could click to receive additional support as needed. For example, one teacher said, 'Why don't you add a button that says, "click here if you're not sure what to do!" Because if they get stuck, they won't be able to get un-stuck.'

Results of the five semi-structured interviews informed our iterative design process as we created staged lessons. The entire research and web development teams reviewed suggestions from these semi-structured interviews on an ongoing basis and integrated solutions for multiple issues related to the key themes before moving to staged lessons. For example, we added pictorial icons that represented and supplemented concepts introduced in the lessons and could be carried across lessons. We updated features of the characters that delivered instruction to promote a more realistic and culturally responsive representation and added the ability for students to use pictures to represent themselves. Furthermore, we created support features (i.e. modifications and accessibility), including options for students to self-monitor and review material if they were unsure of how to respond to a question or activity in the App. Additionally, we revised character prompts and terminology within the App based on (a) student and teacher recommendations and (b) consistency with the SDLMI framework. These revisions were made prior to the start of user testing, allowing participants to interact with the most current version of the App in order to provide additional points of feedback and recommendations for improvement.

User Testing to Support Iterative Design and Development

The overall themes were also reflected during user testing. The modification and accessibility theme was evident during user testing in that students indicated the App was engaging and simple to follow (e.g. 'I wouldn't have to call for tech support!'). Another student said, 'The lesson kept moving and going, so it wasn't boring.' Related to motivation and engagement, students stated appreciation for the visual aesthetic look of the App (i.e. 'It looks like SouthPark!' a student observed, referring to a popular television show). Students commented that the student characters in the App, who provided their experiences with goal setting, 'looked real' and could blink, move their legs, and engage in other naturalistic physical movements. While teachers viewed narration voices as improved, students continued to express dislike for the computer-generated voices (e.g. 'She [the teacher character] sounds sad . . . '). To remedy this, researchers worked with the web developers to identify other methods of voice narration that utilised naturalistic prosody, cadence, and expression of human voices; therefore, Amazon Polly© was chosen because this cloud-based service can convert text into 'lifelike speech' (Amazon Polly, 2019).

Students also identified several additional areas for promoting engagement, including a desire for: (a) more specificity related to Student Questions within each lesson (e.g. 'What does "what do I know about it now" mean?'); and (b) more scenarios and examples in the lessons. Students asked for clarification when phrasing of objectives did not match phrasing throughout the lesson (e.g. ensuring what was on the screen was what was read aloud). Related to modifications and accessibility, a salient suggestion from students was to place previous student answers (e.g. goal area, barriers, needs) on pages where students had to answer new questions as reminders. For example, one student said,

'The previous lesson had me identify what my barriers were, but I do not remember what I said about what I want to do better.' To address this within the App, we made changes so users are provided with their previous, relevant answers in boxes on the screen. This will ensure end-users have a prompt related to what was previously stated to guide their new answers and promote accessibility and ongoing engagement with the App.

Additionally, user testing with teachers reflected the motivation and engagement theme. Teachers provided observations and suggestions concerning visual aesthetics (e.g. 'On my screen, the bubble covers up the student question. Can you move that?'). Related to language, teachers stated character voices were more engaging than previous versions and believed the automated voices were more realistic and matched the student character. Most of the suggestions made by teachers during user testing focused on the modifications and accessibility theme. For example, we made minor revisions focused on word choice to promote understanding (e.g. 'She [teacher character] should say accommodations, plural, instead of accommodation . . . ', 'Remind them here that barriers are challenges that you face . . . ') based on teacher feedback. Teachers also communicated opportunities where the App could provide more direction to students as end-users (e.g. 'You'll need to add a direction there and tell the student, "click on the need that you would like to improve on," so they know what to do.'). They believed explicit directions would limit confusion and increase engagement within the App and advocated for simplified formatting, such as displaying one objective at a time instead of multiple objectives all at once. Several teachers perceived the App as needing more activities to supplement explicit instruction. One teacher remarked, 'You ought to build in a brain break in between lessons,' and another suggested, 'Or a memory game or something to get points and work towards a game at the end.' The most common suggestion was to create a feature for students to review lesson sections. For example, one teacher remarked, 'So, if a student checks "no" to meeting an objective and says they didn't meet it, then maybe they need an option to go back and review a part of the lesson they missed or didn't get right.'

Each theme was considered as the remaining lessons of the GSC App were created and the fully functioning prototype was developed. Specifically, ongoing changes were made to ensure (a) student and teacher characters addressed focus group feedback, (b) language throughout the App was consistent with end-user preferences and the SDLMI instructional framework, and (c) most importantly that features for motivation, engagement, and accessibility were fully deployed. For example, designing the best interface to pull answers from previous lessons to new lessons was a major focus.

GSC App Prototype

Iterative feedback from all focus groups along with input from researchers, existing materials, and the web development team led to the creation of the final prototype. The GSC App prototype includes a total of 14 lessons. This includes lessons for each of the 12 SDLMI questions as well as two introductory lessons that emerged based on existing materials and feedback from students and teachers about the need to introduce key concepts and content to prepare students to fully engage and be motivated to navigate the 12 GSC App lessons. Content for the two introductory lessons included: (a) introducing lesson objectives; (b) defining self-determination; (c) overviewing how to establish short- and long-term goals; (d) gaining knowledge of the three phases of the SDLMI,

including key terms; and (e) identifying how each phase of the SDMLI would help students, as end-users, meet objectives of the GSC App. The 12 lessons focused specifically on the three phases of the SDLMI (i.e. Phase 1 [Lessons 1–4], Phase 2 [Lessons 5–8], Phase 3 [Lessons 9–12]). The format of each lesson included: (a) an introduction to the lesson, (b) a student question that would be answered during the lesson, (c) objective(s), (d) reviewing the three phases of the SDLMI, (e) reviewing what was learned so far, (f) instruction to facilitate the end-user's ability to answer the student question, and (g) reviewing lesson objective(s) to facilitate student self-reflection. If the end-user indicated 'no' to the review of objective(s) at the end of the lesson, the App redirects them back to relevant lesson sections for review. Design and development of the 14 GSC App lessons resulted in a fully functioning GSC App prototype that will be used for ongoing feasibility and fidelity testing.

Discussion

Over a nine-month period, multiple steps were implemented to inform the creation of the fully functioning GSC App prototype for ongoing testing in the next phase of our research. Our iterative design involved gathering ongoing feedback from focus groups across stages of development from end-users (students), as well as teachers, that would support the implementation of the GSC App in the classroom. Identifying the themes (i.e. motivation and engagement, modifications and accessibility) within and across the stages of development allowed us to identify the needs and preferences of students with disabilities who would use the App and incorporate their feedback, as well as feedback from teachers, into the ongoing development. Students, particularly those with disabilities, often are not included in the instructional development process particularly around secondary transition interventions and web-based interfaces. Involving students in the development of the App was paramount given our focus on self-determination and supporting students to self-direct the goal setting and attainment process taught through the SDLMI.

However, there were multiple factors to consider alongside student and teacher preferences, including the intent of the SDLMI, technology options, and resources. For example, a key theme across phases of focus groups and iterative coding and analysis was the role of built-in App features that students could connect with to enhance motivation and engagement. This primarily emerged with regard to how students themselves would be represented in the App and how instruction would be delivered. Our initial plan was to enable students to create and customise avatars and see these when reviewing their goals and progress in the App. However, the associated costs and development efforts, particularly to include the features and characteristics necessary for students to truly customise an avatar turned out to be complicated and prohibitive. Our ultimate decision was to use a picture or 'selfie' taken through the App or uploaded; however, more work is needed on the best mechanism to promote student engagement, as there is limited research providing clear direction in this area (Christopoulos et al., 2018).

Similar issues emerged with who delivered the content and their representativeness. In the initial iterations of the wireframes and mockups, the teacher character was delivering much of the instruction. This likely emerged because most of the existing SDMI instruction materials were created for teachers to deliver, and this material drove the creation of the

wireframes. But, students were clearly justified in pushing to have more student-delivered instruction and student examples embedded in the App. Not only is having student characters deliver content more student-focused and consistent with the goals of the SDLMI, one of the goals of creating this App was to further student engagement and connection to the SDLMI process. This theme pushed the research and web development teams to reframe our focus, using more examples delivered by student, not teacher, characters. Similarly, it prompted us to edit wording and examples throughout the App to be more student-focused. Each lesson now includes multiple examples of student characters talking about how they responded to the questions in each lesson, and we created a set of student characters that represent diverse backgrounds, addressing students' desire to see themselves in the characters (Bailenson et al., 2008). An additional reflection is the importance, even in the early stages of development (e.g. wireframes), of ensuring web development protocols take into account the diverse audience that is the focus of educational technologies and build diversity into character representation from the beginning.

Another theme that emerged was ensuring that suggested modifications and accessibility of content, particularly from teachers, was aligned with the purpose of the GSC App (i.e. promoting student self-direction) and the SDLMI (e.g. student-directed goal setting and problem solving). For example, at one stage, teachers requested the ability to add and/or control goals for each student and the ability to edit or modify action plans within the App. However, this was incongruent with the focus of the SDLMI, which is shifting from teachers directing the goal setting process to supporting students to set their own goals (Shogren et al., 2018). It became clear teachers were actually most concerned with ensuring students had the right supports in place to engage in goal setting and action planning. The modifications and accessibility theme was reflected in the ongoing suggestions related to (a) carrying forward student answers from previous lessons as reminders and (b) prompts and supports to review lesson sections if students were stuck or indicated at the end of a lesson that they were still confused. Overall, this theme from teachers suggested their desire for resources to support students in using the App, as well as the need for a backend with administrative features to enable teachers to identify student progress and areas in which students may need support.

Ultimately, our findings initially suggest that delivering the SDLMI via technology through the GSC App is viewed by students and teachers as a means for students to be more directly engaged in self-determination instruction in their classroom and during transition planning. Specifically, the GSC App uses the process model of engagement framework (O'Brien & Cairns, 2016; O'Brien & Toms, 2008) and principles of instructional design (Coyne et al., 2011) to remove the need for teachers to directly deliver SDLMI instruction by providing a variety of features to enable students to self-direct and personalise the goal setting and attainment process. Feedback also suggested the length and interactive features of lessons were sufficient to hold student attention during the approximate 15 min lessons to be completed by students. It is expected that if students can engage with the App approximately twice per week, they can complete the three phases over one academic semester. The App mirrors the SDLMI's focus on repeated use over multiple semesters, so that students can set new goals or refine their action plans or evaluation strategies. The final version of the App will be designed to enable students to, at the end of Phase 3, determine if they want to set a new goal (return to Phase 1) or

continue to work on their goal and revise their action plan (return to Phase 2). Throughout their use of the App, students will have access to ongoing information and prompts in order to refine their skills over time by working on multiple goals and action plans.

Additionally, through the backend and administrative features, teachers will be able to see student responses, track them over time, and provide supports that students need. We will develop resources for teachers to use to support students in using the App (e.g. how to bring content from the App into class activities, transition planning, and instruction). We will develop procedural fidelity checklists for student use of the App as well as teacher support. Data collected within the App (e.g. lessons completed, time in App) will enable us to further refine these supports for both students and teachers.

Limitations

While the overall response to the GSC App was positive and themes suggest motivation and excitement for use of the App, an important consideration is that focus groups gathered feedback on wireframes, mockups, and staged lessons 1 through 3, as opposed to the entire set of lessons and prototype with all features. Further, there were still coding errors (e.g. read aloud text not aligned with text on screen in some lessons) that students and teachers noticed that likely distracted from identifying or focusing on other features. As such, we will need to carefully examine student and teacher responses in the next stage of the research focused on testing and perspectives on the feasibility of use. Further, while we attempted to recruit a diverse sample of focus group participants, the sample was generated through research contacts and limited to one region of the country. More research is needed with larger and more diverse groups of students, teachers, and locales.

Implications for Research and Practice

Technology provides a medium to deliver personalised content that incorporates student preferences and unique learning needs. Further, technology-based supports related to accessibility, and presenting previously learned content can enhance the instructional experience (Marino, 2010; U. S. Department of Education, Office of Educational Technology. (USDOE, 2017). The SDLMI is an established evidence-based practice in secondary transition (Hagiwara et al., 2017); however, it has been developed and tested as a teacher-delivered intervention. Technology provides a different medium to conceptualise the delivery of instruction, enabling teachers to move to a role of supporting students to generalise content learned through the GSC App to other learning activities. This addresses concerns related to teacher time, training, and challenges with individualisation of SDLMI instruction. Ongoing work is needed to evaluate the cost-effectiveness of the GSC App, particularly in comparison to teacher-delivered intervention. As larger scale research is done with the App, researchers must focus on collecting the data needed to inform cost-effectiveness and decision making in practice, across diverse contexts.

Next, the iterative design activities reported in this paper, suggest that students as well as the teachers, view the GSC App as a potentially engaging and interesting way to deliver self-determination instruction aligned with the SDLMI. By incorporating the voices of the end-users through the development process, we believe we enhanced the feasibility of the use of the App in real-world classroom contexts, and the next phase of this research

will enable us to further test this hypothesis and provide guidance for the supports that will be needed to enable students and their teachers to engage in self-determination instruction using the GSC App. After establishing the supports needed (e.g. teacher implementation guides; additional modifications needed to the GSC App), we will be able to test the preliminary impact on student outcomes, providing guidance to both researchers and practitioners on the use of technology to deliver self-determination instruction and ways to support this important outcome in the classroom.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the U. S. Department of Education, Institute for Education Sciences [R324A180012]. The research reported here was supported by the Institute of Education Sciences, U. S. Department of Education, through Grant R324A180012 to The University of Kansas. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

ORCID

Valerie L. Mazzotti http://orcid.org/0000-0003-2616-8859
Karrie Shogren http://orcid.org/0000-0001-7925-1299
Jared Stewart-Ginsburg http://orcid.org/0000-0001-5424-7189
Danielle Wysenski http://orcid.org/0000-0002-0981-7872
Kathryn Burke http://orcid.org/0000-0002-1271-3257

References

Amazon Polly. (2019). *AWS documentation*. https://docs.aws.amazon.com/polly/latest/dg/what-is.html

Bailenson, J., Blascovich, J., & Guadagno, R. (2008). Self-representations in immersive virtual environments. *Journal of Applied Social Psychology*, *38*(11), 2673–2690.

Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, *71*(2), 195–207.

CAST (2018). *Universal design for learning guidelines version 2.2*. http://udlguidelines.cast.org

Cho, H.-J., Wehmeyer, M., & Kingston, N. (2011). Elementary teachers' knowledge and use of interventions and barriers to promoting student self-determination. *The Journal of Special Education*, *45*(3), 149–156.

Christopoulos, A., Conrad, M., & Shukla, M. (2018). Increasing student engagement through virtual interactions: How? *Virtual Reality*, *22*(4), 353–369.

Coyne, M. D., Kame'nui, E. J., & Carnine, D. W. (2011). *Effective teaching strategies that accommodate diverse learners* (4th ed.). Upper Saddle River, NJ: Pearson.

Fitzgerald, G., Koury, K., & Mitchem, K. (2008). Research on computer-mediated instruction for students with high incidence disabilities. *Journal of Educational Computing Research*, *38*(2), 201–233.

Glesne, C. (2006). *Becoming qualitative researchers: An intduction*. Upper Saddle River, NJ: Pearson.

Hagiwara, M., Shogren, K. A., & Leko, M. L. (2017). Reviewing research on the self-determined learning model of instruction: Mapping the terrain and charting a course to promote adoption and use. *Advances in Neurodevelopmental Disorders*, *1*(1), 3–13.

Leinonen, T., Keune, A., Veermans, M., & Toikkanen, T. (2016). Mobile apps for reflection in learning: A design research in K-12 education. *British Journal of Educational Technology*, *47*(1), 184–202.

Marino, M. T. (2010). Defining a technology research agenda for elementary and secondary students with learning and other high-incidence disabilities in inclusive science classrooms. *Journal of Special Education Technology*, *25*(1), 1–27.

Mazzotti, V. L., Rowe, D., Kwiatek, S., Voggt, A., Chang, W., Fowler, C. H., Test, D. W. (2021). Secondary transition predictors of post-school success: An update for the field. *Career Development and Transition for Exceptional Individuals*, *44*(1), 47–64.

Mazzotti, V. L., Test, D., & Wood, C. (2013). Effects of multimedia goal-setting instruction on students' knowledge of the self-determined learning model of instruction and disruptive behavior. *Journal of Positive Behavior Interventions*, *15*(2), 90–102.

Newman, L., & Madaus, J. (2015). An analysis of factors related to receipt of accommodations and services by postsecondary students with disabilities. *Remedial and Special Education*, *36*(4), 208–219.

O'Brien, H. L., & Cairns, P. (2016). *Why engagement matters: Cross disciplinary perspectives of user engagement in digital media*. New York: Springer.

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology*, *59*(6), 938–955.

Office of Education Technology. (2017). *Reimaging the role of technology in education: 2017 National Education Technology Plan Update*. Washington, D.C.: U.S. Department of Education.

Saldaña, J. (2013). *The coding manual for qualitative researchers* (Second ed.). Los Angeles: SAGE Publications.

Shogren, K. A., Abery, B., Antosh, A., Broussard, R., Coppens, B., Finn, C., . . . Wehmeyer, M. L. (2015). Recommendations of the self-determination and self-advocacy strand from the national goals 2015 conference. *Inclusion*, *3*(4), 205–210.

Shogren, K. A., & Burke, K. M. (2019). *SDLMI teacher's guide supplement: Implementing the SDLMI to enhance transition planning*. Lawrence, KS: Kansas University Center on Developmental Disabilities.

Shogren, K. A., Hicks, T. A., Burke, K. M., Antosh, A., LaPlante, T., & Anderson, M. H. (2020). Examining the impact of the SDLMI and whose future is it? Over a two-year period with students with intellectual disability. *American Journal on Intellectual and Developmental Disabilities*, *125*(3), 217–229.

Shogren, K. A., Palmer, S. B., Wehmeyer, M. L., Williams-Diehm, K., & Little, T. D. (2012). Effect of intervention with the self-Determined learning model of instruction on access and goal attainment. *Remedial and Special Education*, *33*(5), 320–330.

Shogren, K. A., Raley, S. K., & Burke, K. M. (2019). *SDLMI teacher's guide supplement: Implementing the SDLMI with the whole class*. Lawrence, KS: Kansas University Center on Developmental Disabilities.

Shogren, K. A., Raley, S. K., Burke, K. M., & Wehmeyer, M. L. (2018). *The Self-Determined learning model of instruction: Teacher's guide*. Lawrence, KS: Kansas University Center on Developmental Disabilities.

Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Forber-Pratt, A. J., Little, T. J., & Lopez, S. J. (2015). Causal agency theory: Reconceptualizing a functional model of self-determination. *Education and Training in Autism and Developmental Disabilities*, *50*(3), 251–263.

Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Rifenbark, G. G., & Little, T. D. (2015). Relationships between self-determination and postschool outcomes for youth with disabilities. *Journal of Special Education*, *53*(4), 30–41.

Tague, N. R. (2004). *The quality toolbox* (2nd ed.). Milwaukee, WI: ASQ Quality Press.

Test, D. W., Fowler, C. H., Richter, S. M., White, J., Mazzotti, V., Walker, A. R., … Kortering, L. (2009). Evidence-based practices in secondary transition. *Career Development for Exceptional Individuals*, *32*(2), 115–128.

Trainor, A. A., & Graue, E. (2014). Evaluating rigor in qualitative methodology and research dissemination. *Remedial and Special Education*, *35*(5), 267–274.

U. S. Department of Education, Office of Educational Technology. USDOE. (2017). *Reimagining the role of technology in education: 2017 National Education Technology plan update*. https://tech.ed.gov/files/2017/01/NETP17.pdf

Web Content Accessibility Guidelines 2.0. WCAG. (2019). http://www.w3.org/TR/WCAG20

Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. E. (2000). Promoting causal agency: The Self-Determined learning model of instruction. *Exceptional Children*, *66*(4), 439–453.

Wehmeyer, M. L., Palmer, S. B., Shogren, K. A., Williams-Diehm, K., & Soukup, J. H. (2013). Establishing a causal relationship between interventions to promote self-determination and enhanced student self-determination. *The Journal of Special Education*, *46*(4), 195–210.

Wei, X., Wagner, M., Hudson, L., Yu, J. W., & Javitz, H. (2016). The effect of transition planning participation and goal-setting on college enrollment among youth with autism spectrum disorders. *Remedial and Special Education*, *37*(1), 3–14.

Wengraf, T. (2001). *Qualitative research interviewing: Biographic narrative andsemi-structured methods*. London: SAGE.