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Article abstract

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Abstract

Research has suggested that adding cognitive support technologies to the transition planning process enhances student self-determination above and beyond traditional, book or paper-based self-determination curricular materials. However, limited research has examined how teachers perceive the impact of cognitive support technologies on student capacity and opportunity for self-determination. The present study used multivariate analysis of covariance to examine teacher perceptions of student capacity and opportunity for self-determination over time based on group random assignment to a self-determination curricula alone group or a self-determination curricula plus cognitive support technology group. The impact of disability label (learning disability vs. intellectual disability) on educator perceptions was also examined. Findings suggest a complex pattern of differences over time; there was a multivariate effect for the interaction of time, disability, and technology access, but when decomposing these differences at the univariate level, the primary differences were in educator ratings of capacity, not opportunity. Differences based on disability label were also found, with educators rating students with intellectual disability significantly lower in their capacity for self-determination, but not opportunity. Implications for future research and practice are discussed.

Keywords : support technologies, teacher perceptions, students, self-determination, intellectual disabilities

Résumé

De récentes recherches suggèrent que l'utilisation de technologies de soutien dans le cadre du processus de planification des transitions vécues par les étudiants améliore davantage leur autodétermination que le matériel pédagogique traditionnel proposé sous forme de livres ou de documents en format papier. Peu de recherches se sont toutefois penchées sur les perceptions des enseignants concernant l'impact des technologies de soutien sur les capacités et les opportunités des élèves à s'autodéterminer. Le présent article emploie une analyse de la covariance multivariée afin d'examiner l'évolution, dans le temps, des perceptions des enseignants quant aux capacités et aux opportunités d'autodétermination des élèves. Deux groupes ont été constitués par le biais d'une méthode d'assignation par hasard : l'un employant uniquement le matériel pédagogique traditionnel et l'autre auquel était ajouté l'accès à un groupe d'apprentissage sur les technologies de soutien. L'influence de l'étiquette attribuée au diagnostic (troubles d'apprentissage vs. incapacités intellectuelles) sur les perceptions des enseignants a aussi été examinée. Les résultats suggèrent l'existence d'un ensemble complexe de différences dans le temps, notamment un effet multivarié interagissant en fonction du temps, des incapacités et de l'accès aux technologies. Lorsque décomposées à un niveau univarié, ces différences concernaient non pas les opportunités, mais l'évaluation des capacités des étudiants à s'autodéterminer. Des différences fondées sur l'étiquette attribuée au diagnostic ont également été identifiées, les enseignants évaluant les élèves ayant des incapacités comme ayant les mêmes opportunités, mais pas autant de capacités à s'autodéterminer. Les implications de ces résultats pour la recherche et la pratique sont abordées dans la conclusion.

Mots-clés : technologies de soutien, perceptions des enseignants, étudiants, autodétermination, incapacités intellectuelles

Promoting self-determination has been identified as a key element of supporting adolescents as they transition from school to adult life. In the United States, researchers have found that promoting self-determination in transition planning impacts self-determination outcomes in secondary school (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Wehmeyer et al., 2012) as well as post-school employment and community access outcomes (Shogren, Wehmeyer, Palmer, Rifenbark, & Little, in press). Internationally, researchers have demonstrated that self-determination is a key predictor of quality of life (Lachapelle et al., 2005; Schalock et al., 2005).

Increasingly, educators have access to a wide array of resources to promote self-determination. Research has established the efficacy of several self-determination curricula that can be used to teach and create opportunities for the development of self-determination skills (Martin et al., 2006; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2013). For example, Wehmeyer et al. (2013) examined the impact of multiple self-determination curricula on student self-determination outcomes using a group randomized control trial design. The researchers found that when students were exposed to self-determination interventions over a three year period in secondary school, they showed significantly greater growth in their self-determination scores than a group of students who did not receive self-determination instruction.

Despite available, research-based methods, materials, and strategies to promote self-determination, educators continue to report feeling ill-prepared to teach skills leading to enhanced self-determination and to create opportunities within their classrooms (Karvonen, Test, Wood, Browder, & Algozzine, 2004). Further, despite advances in technology and the growing field of applied cognitive technologies (Wehmeyer & Shogren, in press), existing materials to promote self-determination in the school context tend to use traditional formats (e.g., print-based / picture-based books and materials) to deliver content to students. This means that teachers provide much of the direct instruction and support for students to facilitate opportunities for self-determination.

Cognitive support technologies have been created, however, that can be used alone or in combination with other interventions to promote self-determination to deliver instruction and enable student-direction over the process of developing self-determination skills. For example, AbleLink Technologies has developed several programs that can be used to support to people with disabilities to develop skills leading to enhanced self-determination. For example, WebTrek is a cognitively accessible web browser that uses key error minimization features to enable students to be more independent in searching the web and navigating websites. Decision Manager is a program that uses customized picture and audio prompts to guide users through making decisions. It can be programmed with between two and four choices at each decision point, each with specific steps that follow. Support persons (e.g., educators, family members) can create decision making tasks using AIMS Task Builder to record audio and capture video or picture prompts that are loaded into Decision Manager, which was designed with cognitive accessibility features to enable independent use and navigation by people with disabilities. Tasks can be created, for example, that guide students through inviting people to their transition planning meeting, and decision points (and associated prompts) can be embedded for topics ranging from whom to invite, to how to invite them, to how to introduce them. This software allows people who may struggle with complex user-interfaces for navigating the web (WebTrek) or who may benefit from self-directed visual and audio prompting systems to learn decision making skills (Decision Manager). The programs are described in greater depth in Wehmeyer, Palmer, Williams-Diehm, et al. (2011).

Researchers have found that when cognitive support technologies are used to supplement instruction with traditional materials to promote self-determination, greater gains in student self-determination result (Wehmeyer et al., 2011). Research has not yet, however, exam-

ined the impact that the addition of cognitive support technologies has on teacher perceptions of student capacity and opportunity for self-determination. Capacity for self-determination has been defined in the literature as students' "knowledge, abilities, and perceptions that enable them to be self-determined and to feel good about it" and opportunity for self-determination has been defined as "students' chances to use their knowledge and abilities" (Wolman, Campeau, Dubois, Mithaug, & Stolarski, 1994, p. 5).

Understanding teacher perceptions of the impact of cognitive support technology on capacity and opportunity for self-determination is important, particularly given past research suggesting teachers struggle to identify opportunities for promoting student self-determination, particularly for students with intellectual disability. Applied cognitive technologies may provide a useful support for students and teachers working to increase the available opportunities for students to practice self-determination skills. For example, Shogren, Plotner, Palmer, Wehmeyer and Paek (in press) found that when educators worked with students implementing self-determination curricula (although not cognitive support technologies) their perceptions of student's capacity and opportunity for self-determination grew significantly. No research, to our knowledge, has explored the impact of cognitive support technologies on educator's perceptions of student capacity and opportunity for self-determination. The purpose of the present study, therefore, was to explore the impact that cognitive support technologies had above and beyond standard self-determination curricula on educator perceptions of student's capacity and opportunity for self-determination. We used data on educator perceptions collected during a large randomized-control trial evaluation of self-determination interventions (Wehmeyer et al., 2013), where a subset of students also had access to cognitive support technologies in addition to self-determination curricula. Further, given previous research suggesting educators tend to rate capacity for self-determination lower for students with intellectual disability, although they do not tend to rate opportunities differently (Shogren et al., 2007) we wanted to examine the degree to which access to cognitive support technologies interacted with disability label in impacting educators perceptions of capacity and opportunity for self-determination.

Method

To address our research questions, we used data on educator perceptions of student capacity and opportunity for self-determination collected as part of a three-year, group randomized control trial study reported by Wehmeyer et al. (2013). In this study, 371 high school students with disabilities were randomly assigned by their high school campuses to a self-determination curricula intervention group where the high school campuses selected one of six research-based self-determination curricula - *ChoiceMaker* (with The Self-Directed IEP materials, Martin, Marshall, Maxson, & Jerman, 1996), *NEXT S.T.E.P.* (Halpern et al., 1995), *Self-Advocacy Strategy* (Van Reusen, Bos, Schumaker, & Deshler, 1994), *Self-Determined Learning Model of Instruction* (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000), *Steps to Self-Determination* (2nd ed., Field & Hoffman, 1996) and *Whose Future is it Anyway?* (2nd ed., Wehmeyer et al., 2004). Teachers on campuses not assigned to the intervention group received training on parent involvement practices to control for the effect of training and interaction with project staff. A subset of the campuses assigned to the self-determination curricula intervention group (approximately 25%) also received access to cognitive support technologies (WebTrek and Decision Manager, for students, and AIMS Task Builder for educators). Wehmeyer, Palmer, Williams-Diehm, et al. (2011) examined the impact of the self-determination curricula alone and combined with cognitive support technologies on student self-reported self-determination, documenting that access to cognitive support technologies in combination with self-determination curricula led to greater growth in student self-determination. However, data on educator perceptions was never analyzed. Thus, the present analyses used data from Wehmeyer et al. (2013) to examine the impact of cognitive support technologies on educator perceptions of student

capacity and opportunity for self-determination.

Participants and Procedure

For the present analyses, educator data on 204 high school students with intellectual disability or learning disabilities who participated in the control (received print version of instructional material to promote self-determination) and the treatment (e.g., delivery of content through cognitively-accessible technology supports) groups. The student participants received special education services under the categorical label of intellectual disability (31%) or learning disability (69%); 57% were male and 43% were female. The majority of student participants were Caucasian (68%), although approximately 20% of students were African American, and 27% reported being of Hispanic ethnicity. The mean age of the student participants at the start of the study was 14.3 (*SD* = 1.25; Range 14.3 – 20.5). In terms of educators, 98 teachers provided data on the 204 high school students, with each teacher providing data on between 1 and 14 students (*M* = 2; *SD* = 3.0). The majority of teachers had known the student a year or less, although some teachers reported working with students over multiple years.

The sample for the group randomized control trial study (Wehmeyer et al., 2013) was generated by soliciting the participation of high school campuses across six states in the Midwest and South Central United States. Project staff contacted special education administrators (e.g., directors of special education, transition specialists) and 38 districts agreed to participate. Teachers within the district were then provided information about the study and, if they were interested, worked with project staff to identify student participants. Next, parent/ guardian consent forms were sent home with students. Each campus was randomly assigned to the intervention or control condition. At the start of the project (Year 1), baseline self-determination data was collected. Specifically, students and teachers completed the AIR Self-Determination Scale. Intervention campuses then received training in the self-determination curricula, and for approximately 25% of the sample, the cognitive support technologies. Over the course of the three year project, intervention campuses received ongoing support from project staff, including additional training, monthly email resources, and updates to the cognitive support technologies (when relevant). The same assessments that were completed as baseline were repeated one year and two years later. In the present study, teacher report data from the *AIR Self-Determination Scale* (the only self-determination assessment that has a teacher report form) was used to address our research questions.

Intervention

- *Curricula to Promote Self-Determination*

As mentioned previously, schools in the intervention group selected from six self-determination related curricula based on the needs of their campus, teachers and students. The six curricula each had research-support, but had not been evaluated in a randomized control trial. The six curricula included: *ChoiceMaker* (with The Self-Directed IEP materials, Martin et al., 1996), *NEXT S.T.E.P.* (Halpern et al., 1995)*, Self-Advocacy Strategy* (Van Reusen et al., 1994), *Self-Determined Learning Model of Instruction* (Wehmeyer, Palmer, et al., 2000), *Steps to Self-Determination* (2nd ed., Field & Hoffman, 1996) and *Whose Future is it Anyway?* (2nd ed., Wehmeyer et al., 2004). Wehmeyer and Field (2007) provide a comprehensive review of each curricula, and we provide a brief overview below.

The ChoiceMaker Curriculum (with *The Self-Directed IEP* materials) (Martin, Marshall, Maxson, & Jerman, 1993) has three sections (Choosing Goals, Expressing Goals, and Taking Action) with 2 to 4 teaching goals and multiple teaching objectives per section. The three sections focus on teaching students the skills needed to describe transition-related goals linked to their skills, interests and abilities. The *Self-Directed IEP* lessons enable students to learn leadership skills to manage their IEP meeting and describe their interests, skills, limits and goals identified through the *Choosing*

Goals lessons. The *Self-Advocacy Strategy* (Van Reusen, Bos, Schumaker, & Deshler, 2002) was "designed to enable students to systematically gain a sense of control and influence over their own learning and development" (p. 1). There are lessons on education and transition planning, developing plans, and describing oneself, presenting oneself at an IEP meeting, and receiving and integrating feedback.

Steps to Self-Determination (2nd Ed.) (Hoffman & Field, 2005) curriculum includes a series of classroom lessons and materials for a six hour workshop for students. The lessons focus on goal setting, self-advocacy, and decision making. *Whose Future is it Anyway?* (2nd Ed.) (Wehmeyer, Lawrence, Kelchner, Palmer, Garner, & Soukup, 2004) is designed to be a student-directed learning process consisting of 36 sessions that guides students through the process of learning about transition planning, disability awareness, decision making, securing resources, developing goals, communicating, and advocacy. The *Self-Determined Learning Model of Instruction* (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000) is a model of teaching based on the component elements of self-determination, the process of self-regulated problem solving, and research on student-directed learning. It includes a three-phase instructional process where each instructional phase presents a problem to be solved by the student. The student solves each problem by posing and answering a series of four *Student Questions* per phase that students learn, modify to make their own, and apply to reach self-selected goals. Each question is linked to a set of *Teacher Objectives*. Each instructional phase includes a list of *Educational Supports* that teachers can use to enable students to self-direct learning. Finally, *NEXT S.T.E.P. Curriculum* (Halpern, Herr, Doren, & Wolf, 2000) consists of 16 lessons that can be delivered in a 50-minute class period. Lessons include teacher and student materials, videos, guidelines for involving parents and family members and a process for tracking student progress.

- Applied Cognitive Technologies

Project staff identified several cognitively accessible technology supports to implement. All students in the intervention or treatment condition had access to each of the following technology supports. The supports were designed to be appropriate for youth with intellectual disability or learning disability, and could be used flexibly based on each students level of support need as described below. *WebTrek* (Davies, Stock, & Wehmeyer, 2001) is a cognitively-accessible Web browser, designed to provide an accessible interface to perform the most common Internet tasks, such as entering a URL address, searching the Internet, saving favorite sites and returning to favorite sites. The browser has a number of features that make it cognitively accessible. First, there are two levels of audio prompting built into the browser. The first is a type of "button talk" where a message is played describing the use of a button when the cursor arrow is placed over it (without clicking). This is similar to the balloon help that displays the name or function of a button when the mouse is moved over it in most Windows applications. The second type is "error minimization" cueing, in which a message is played following a user-initiated event (such as a click) to guide the user to the next-most-likely step in a task. A second feature involves reduced screen clutter, where buttons or other on-screen features in WebTrek are only displayed when they have a use, as opposed to simply being "grayed out." Third, the browser has personalization and customization features that display the user's name on the Start button and Start page. Fourth, WebTrek is graphics rich. For example, WebTrek uses pictures instead of word-based icons and includes a search-and-save feature that retrieves pictures from Web sites searched and saves them to the Favorites List as a picture (instead of text).

A fifth feature of WebTrek is a built-in screen reader that allows users with minimal reading levels to access written material on a web-site independently. This feature is activated through a button located at the bottom of the screen. In addition, teachers can utilize specific setting

options to make the Internet accessible to users. This includes changing set-up options for students, such as the address-bar, exit, and print options. Teachers can also pre-arrange available websites for students who need additional guidance.

Davies et al. (2001) determined that participants with intellectual disability were better able to independently use the WebTrek browser, when compared with Microsoft's Internet Explorer browser, and experienced fewer errors in common tasks and required less external support to browse the WWW. Teachers were instructed to support students to use the WebTrek browser to search for transition-related information (e.g., locations of vocational rehabilitation (VR) offices, job information, etc.).

Decision Manager (Davies, Stock, & Wehemeyer) is a desktop-PC version of a multimedia decision-aiding software originally designed for a palmtop PC. Both the palmtop and desktop versions operate identically, utilizing customized picture and audio prompts to guide users through any multi-step decision-making process. The system provides two levels of interface that include:

1- a setup, which is used by support providers to create a cueing sequence of pictures and recorded audio;
2- a simplified player interface used by individuals with cognitive impairments to sequentially play back the cues for prompting purposes.

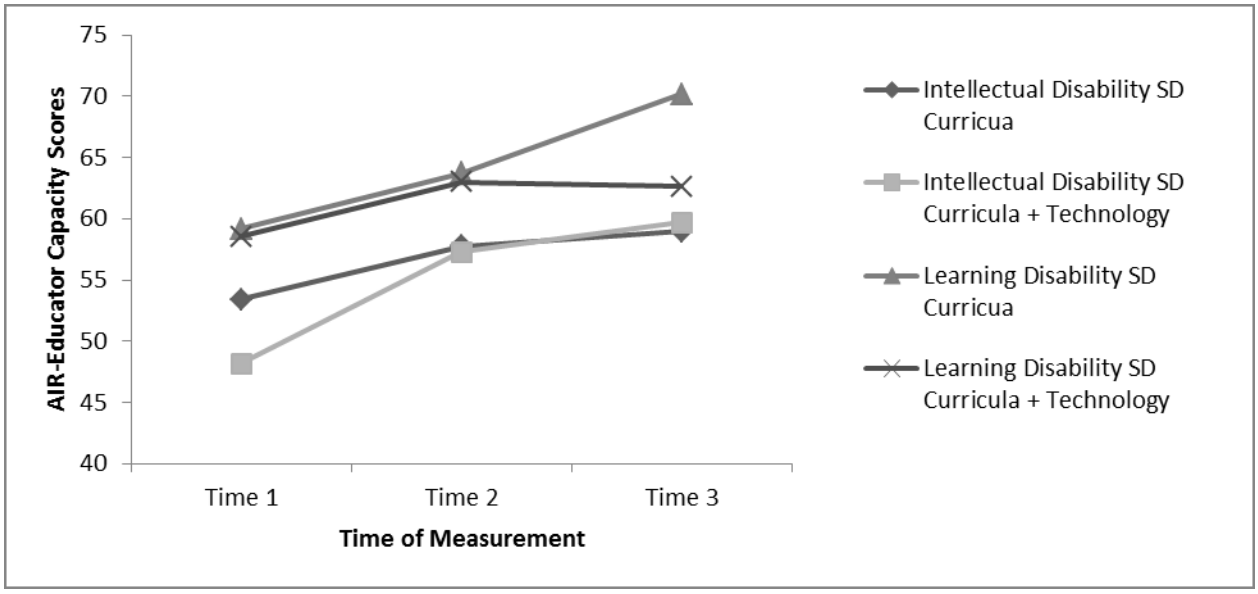
To set up a cueing sequence, support providers follow four general steps:

1- document the activity via task analysis;
2- take digital images of each step while it is being performed (preferably by the person who will use it);
3- record digital audio instructions or cues corresponding with each step (that is, actual voice recordings - not synthesized speech);
4- use the Decision Manager Setup interface to integrate the pictures and audio files into the cueing sequence and decision points.

The system is capable of retaining any number of different tasks sequences at a time, distinguishing between different tasks via icons on the opening display. Users with cognitive disabilities initiate a cueing sequence by clicking (with a mouse, or tapping if a touch screen is used) on the icon representing the desired task. Once a task is initiated, the picture for the first step appears on the screen along with a PLAY button, and a built-in audio message plays stating "Click the PLAY button to begin." When the PLAY button is clicked, the first custom-recorded audio cue plays while the representative picture continues to display on the screen. After the first audio message plays, the button changes to a NEXT button, which when clicked displays the picture for the second step and plays the second audio cue. If the user does not click the NEXT button in a designated period of time, the system also includes the capability to automatically play a built-in message stating, "Click the picture to hear the instruction again, or press the NEXT button if you are done to move to the next step." The user continues in this linear manner until a decision point is reached. At decision points, up to four pictures can be set up to display on the screen at once, each representing a different choice in the decision point (see Figure 1). With the four images displayed, an audio instruction plays related to the set of images. Depending upon which picture is clicked, the system then follows the corresponding sequence of picture and audio cues through to either the next decision point or to completion. In this way the audio instructions and associated picture cues are used to help the user make proper choices given relevant environmental data.

The AbleLink Instructional Media Standard (AIMS) Task Builder was developed to enable users to easily create classroom or individual tasks to import into Decision Manager. Elements that can be used to create tasks may include custom images and symbols, custom audio prompts, custom audio feedback, video clips, custom text strings, an unlimited number of steps, decision points, multiple modes of play, and custom timing to move from one step to the next. AIMS Task Builder is designed for

FIGURE 1: EDUCATOR RATINGS OF STUDENT CAPACITY FOR SELF-DETERMINATION OVER TIME BY ACCESS TO TECHNOLOGY (SELF-DETERMINATION CURRICULA ALONE VS. SELF-DETERMINATION CURRICULA + COGNITIVE SUPPORT TECHNOLOGIES) AND DISABILITY LABEL (LEARNING DISABILITY VS. INTELLECTUAL DISABILITY)



the creation of instructional media for specific individuals, and is available to anyone wishing to create instructional media for use in AIMS compliant players. In addition, AbleLink maintains an online library of AIMS compliant tasks that have been created and from which teachers can locate and use pre-built tasks.

Decision Manager is designed, with the AIMS Task Builder, to provide audio and video prompts for tasks that include decision points. Tasks were created to reflect activities within the respective interventions that involved a decision. In some cases these were simulated tasks related to one of the major areas of transition discussed in an intervention, and in other cases these were specific to a student's chosen are of interest.

Assessment

- The AIR Self-Determination Scale

Educators completed the AIR Self-Determination Scale. The AIR is a criterion-referenced measure of the capacity and opportunity fo self-determination of students with disabilities (Wolman et al., 1994). It is available in three versions, a Student, Educator, and Parent version. In the present study, we used the AIR-Educator. This version includes 30 questions rated on a five point Likert scale from 1 (never) to 5 (always). Capacity and opportunity scores can be calculated, as can a total self-determination score. The Capacity subscale consists three sections with questions regarding student self-determination knowledge, ability, and perceptions (total scores range from 18 to 90). The last two sections ask teachers about their views of student's opportunities for self-determination at school and at home. In this, and previous (Shogren et al., 2008), research we have found that educators tend to report difficulties with reporting on self-determination opportunities at home. Because of the amount of missing data, we chose to only include items from the section on self-determination opportunities at school (six questions) to generate the opportunity subscale score for the present analysis (total scores range from 6 to 30). Cronbach's alpha for the capacity subscale

was .93 and for the opportunity subscale .93, in the present study.

The AIR was developed and normed with 450 students with and without disabilities (Wolman et al., 1994), and shown to have adequate reliability and validity (Mithaug, Campeau, & Wolman, 2003). More recent research (Shogren et al., 2008) suggested that the AIR-Educator is best conceptualized at the subscale level (i.e., capacity and opportunity), because of issues with model fit when a higher-order self-determination construct is introduced.

Analyses

A repeated measures multivariate analysis of covariance (MANCOVA) was used to determine if there were any significant differences in teachers' ratings of student self-determination capacity and opportunity based on (a) time (Time 1 - baseline, Time 2 – end of Year 2, Time 3 – end of Year 3), (b) intervention (self-determination curricula vs. self-determination curricula plus cognitive support technologies, and (c) disability category (intellectual vs. learning disability). Total self-determination scores were not calculated or analyzed because, as mentioned, previously research has suggested that capacity and opportunity subscale scores are the most appropriate unit of analysis (Shogren et al., 2008). Time was a within-subjects factor and treatment and disability category were between-subjects factors. We also included student age as a covariate, because of the range of ages represented in the sample and research suggesting the developmental nature of the self-determination construct during secondary school. When there were significant multivariate results, we then examined univariate results to identify specific patterns of differences, followed by paired contrasts of the means of dependent variables, as needed, across groups.

Results

Table 1 displays the means and standard deviations at each measurement point (Time 1-baseline; Time 2 – end of Year 2; Time 3 – beginning of Year 3) for teacher ratings of the capacity and opportunity of students with intellectual and learning disabilities on the AIR-Educator. The repeated measures MANCOVA suggested a significant between-subjects main effect of disability (Wilk's λ = .84, F (2,84) = 7.86; p < .001; partial η^2 = 0.16), but not technology access or the interaction of technology and disability. Age was a significant covariate (Wilk's λ = .78, F (2,84) = 11.98; p < .001; partial η^2 = 0.22), and was controlled for in all further analyses. There was not a significant main effect of time, but there was a significant interaction between time, disability, and technology access (Wilk's λ = .95, F (4,338) = 2.31; p < .05; partial η^2 = 0.03), suggesting complex patterns of differences over time based on the interaction of disability and technology access. Because of the significant differences at the multivariate level, we followed up with univariate tests and found that, with regard to both the main effect of disability (F (1,85) = 13.39; p < .001; partial η^2 = 0.14) and the interaction between time, technology access and disability (F (1,85) = 8.69; p < .001; partial η^2 = 0.07), differences were concentrated in educator's ratings of student capacity for self-determination. There were no significant univariate differences in the opportunity construct. We followed up with paired contrasts of the means for the capacity construct, finding significant differences (as noted in Table 1) between students with intellectual and learning disability at Time 1, and also at Time 1, significant differences within the intellectual disability group based on intervention group. At Time 2, the significant differences between the intellectual and learning disability group were maintained, but there were no difference within either disability group based on intervention group. At Time 3, the disability group differences were consistent, and a significant difference within the learning disability group based on intervention group emerged. Figure 1 graphically depicts the significant findings related to educator perceptions of capacity.

TABLE 1: MEANS, STANDARD DEVIATIONS, AND N FOR DISABILITY CATEGORY BY GROUP, MEASURE, AND TIME

Group	Measure	Disability		Time 1		Time 2		Time 3	
		LD (*n*)	ID (*n*)	LD	ID	LD	ID	LD	ID
SD Curricula	**Capacity**	79	36	59.18 (11.14)	53.39[a] (11.05)	63.74 (11.53)	57.73[c] (12.00)	70.19 (10.74)	58.94[d] (11.24)
	Opportunity	79	36	24.51 (3.49)	24.40 (3.97)	25.50 (3.73)	24.93 (4.76)	27.42 (2.90)	25.29 (4.54)
SD Curricula + Technology	**Capacity**	53	22	58.55 (10.88)	48.18[ab] (10.05)	63.00 (11.37)	57.26[c] (10.55)	62.62[d] (8.91)	59.69[d] (8.78)
	Opportunity	53	22	24.47 (3.27)	23.50 (3.67)	26.04 (3.70)	24.74 (8.78)	25.27 (2.95)	25.00 (2.63)

Note: Standard deviations are denoted in parentheses. ID = Intellectual Disability; LD = Learning Disability

[a] Post hoc mean contrasts indicate that at Time 1, this group significantly differs from the LD – SD Curricula Group

[b] Post hoc mean contrasts indicate that at Time 1, this group significantly differs from the ID– SD Curricula Group

[c] Post hoc mean contrasts indicate that at Time 2, this group significantly differs from the LD – SD Curricula Group

[d] Post hoc mean contrasts indicate that at Time 3, this group significantly differs from the LD – SD Curricula Group

Discussion

The goal of the present study was to examine the impact that cognitive support technologies, in addition to interventions to promote self-determination, had on educator perceptions of student capacity and opportunity for self-determination as well as the impact of disability label. Researchers have established that, for students, the addition of cognitive support technologies further enhances student self-determination (Wehmeyer et al., 2011), and found that educators tend to perceive changes in capacity and opportunity for self-determination for students when they create opportunities for their students to learn using self-determination curricula (Shogren, Plotner, et al., in press). The impact of combining cognitive support technologies with self-determination curricula on educator's perceptions of student capacity and opportunity has never been explored.

Our findings provide interesting insights into educator perceptions of student capacity and opportunities when cognitive support technologies are introduced, and raise additional issues for further research and provide implications for practice. Not surprisingly, we found a significant multivariate effect of disability label on educator ratings. The pattern of findings is congruent with past research (Carter, Trainor, Owens, Sweden, & Sun, 2010; Shogren et al., 2007) that suggests educators rate students with intellectual disability lower in their self-determination prospects than students with learning disabilities. However, when decomposing the multivariate differences, we found that the disability differences were concentrated in the capacity construct. On average, across time and intervention conditions, educators scored the self-determination capacity of students with intellectual disability seven points lower than students with learning disability, but there no

concomitant differences in opportunity ratings. Although many may argue that as a function of their support needs, students with intellectual disability may need more supports to learn self-determination skills, researchers have consistently demonstrated they can learn these skills with proper instruction (Wehmeyer & Field, 2007). However, educators did not link the lower ratings of capacity with higher opportunities. If educators do perceive students with intellectual disability as needing more support to learn self-determination skills, it seems necessary that more opportunities for students with this label to learn these skills be provided. However, educator ratings did not support this pattern. This suggests that educators may, as previous research has suggested, struggle to identify ways to teach students with intellectual disability self-determination skills (Cho, Wehmeyer, & Kingston, 2011; Wehmeyer, Agran, & Hughes, 2000) or that attitudes about self-determination capacity may serve as a barrier to the implementation of such instruction (Shogren & Broussard, 2011). Further research is needed to examine the discrepancies in educator ratings of capacity and opportunity for students with diverse disability labels and the contextual factors that impact these outcomes. And, in practice, the role of high expectations and the creation of opportunities for self-determination for all students will be important.

In terms of the impact of access to cognitive support technologies, there was a complex pattern of differences over time. Although there was a multivariate effect for the interaction of time, disability, and technology access, when decomposing these differences at the univariate level the primary differences were again found in educator ratings of capacity, not opportunity. Although the scores for student opportunity for self-determination show a general upward trend over time (see Table 1), which is to be expected as all students were exposed to self-determination curricula or self-determination curricula plus cognitive support technologies, these changes were not significant. There may have been some masking of differences because of the more restricted range of possible scores for the opportunity construct, but overall there were no significant univariate differences in opportunity ratings over time or based on disability or intervention group. The finding that educators did not perceive that students who received instruction using the curriculum plus cognitive support technologies as having more opportunities for self-determination is troubling, as the goal of introducing the cognitive support technologies is to create more opportunities for students with disabilities to self-direct their learning and development. Further, student ratings on the AIR-Student suggest that they perceive an increase in their opportunity when they have access to cognitive support technologies (Wehmeyer et al., 2011).

In interpreting the lack of differences in educator's ratings of opportunity, it is possible that factors related to the cognitive support technologies themselves exerted an influence. First, although educators provided support for students to use the technology (e.g., loading it on computers, providing time during the day, creating tasks with the support of project staff in AIMS Task Builder), Web Trek and Decision Manager were designed to make students more self-directed and less dependent on teachers to learn and practice their self-determination skills. Whereas traditional curricula heavily involve educators in structuring instructional activities, cognitive support technologies are designed with specific features, such as error minimization features, to allow students to rely less on teacher support. It is possible that teachers, therefore, define opportunities as activities they are providing and did not perceive the technology as increasing opportunities. In practice, it may be important to provide additional supports to teachers to enable them to see the role of cognitive support technologies in promoting self-determination. Future research is needed that examines educator definitions of opportunities for self-determination and explores ways to expand the vision of opportunities for self-determination.

Unlike for opportunities, educators did perceive differences in capacity over time based on disability and intervention group. There were significant univariate differences in educator ratings of student capacity for self-determination when simultaneously considering time, disabil-

ity, and access to technology – after controlling for age. Contrasts of the means within and across groups for capacity scores suggests that the differences in ratings of capacity based on disability label continue when considering time and intervention group – students with intellectual disability were rated as having lower capacity than students with learning disabilities at each time point, across intervention groups. Interestingly, within the intellectual disability group, the cognitive support technologies appear to have had a significant positive impact on teacher perceptions of capacity. At baseline (prior to any intervention being implemented) students with intellectual disability in the self-determination curricula plus technology group scored significantly lower than students with intellectual disability in the self-determination curricula alone group. However, after a year of intervention, the scores of students in the self-determination curricula plus technology group rose significantly and were maintained at the same level as the self-determination curricula alone group for the remainder of the study. It is possible that this was an artifact of measurement or the sample; however, it is also possible that, particularly for students with intellectual disability, the additional of cognitive support technologies significantly enhances educator ratings of capacity, particularly when students are first exposed to such supports and given opportunities to demonstrate what they can do. This has significant implications for practice, suggesting a key role of technology in impacting teacher perceptions. Further, the "catching up" of this group of students was maintained into the third year of intervention. For students with learning disabilities, however, there was no impact of intervention group on educator perceptions of self-determination capacity at baseline or at Time 2 (end of 2nd year of intervention). However, at the end of Time 3, educators actually rated the capacity of students with learning disabilities in the self-determination curricula plus technology group significantly lower than the curricula alone group. Essentially, as shown in Figure 1, educator ratings of self-determination capacity in the curricula alone group kept growing while ratings in the curricula plus technology group did not. As with the findings specific to intellectual disability, these findings could be an artifact of measurement or the sample, however, it is also possible that the technologies had the most significant impact on educator perceptions during their first year of use, but less so in later years for students with learning disabilities as educators became more used to students using technology in the classroom. Students with learning disabilities may not need the level of support provided by the cognitive support technologies over time, or may need adjustments including new search parameters or decision making task that may or may not have been provided by educators. Further research is needed to examine the impact of cognitive support technologies on educator ratings of student capacity across disability groups, as well as explicit comparisons of educator perceptions to student perceptions. Further, in practice, ways to customize cognitive support technologies to the varying support needs of students with differing disability labels over time, as well as the extent to which students fade their use of technologies or use them long-term needs will be important considerations. While it is logical that changes in teacher perceptions of student capacity would result from instruction and increased access to supports, including cognitively accessible technologies, further research is needed to more specifically explore the degree to which various contextual factors influence perceptions. However, in practice, the findings suggest that the additional of cognitive support technologies has benefits for teachers and students.

Limitations

The results of this study provide interesting information about educator perceptions of student capacity and opportunity for self-determination when teachers are implementing curricula and supporting students to use technology to learn self-determination skills. However, there are several limitations that must be considered in interpreting the findings. First, the primary purpose of the overall project from which these data were collected was to analyze changes in student's self-reported levels of self-determination. For this reason, limited data was collected on teacher characteristics, including factors

that may influence teacher perceptions of student self-determination. Further research is needed that explicitly explores teacher-level factors that influence perceptions of self-determination instruction and technology. Second, educators reported difficulties with completing the opportunities at home subscale of the AIR Self-Determination Scale. This means that the opportunity score was more restricted in the present analyses than in the original assessment, and we were unable to explore the influence of the home environment. Future research that involves educators and family members is needed. Third, there were initial differences between the intervention groups of students with intellectual disability at baseline, despite campuses being randomly assigned to intervention conditions. It is possible that there were school-level factors that were not accounted for in the present analyses that influences these findings. Further research exploring student, teacher, and school-level influences on self-determination is needed.

Implications for Future Research and Practice

Despite the limitations, the results of the present study suggest that educators perceive self-determination instruction and supports as impacting student knowledge, abilities, and perceptions related to self-determination. Further research is needed, however, on strategies to support educators to perceive the instruction and supports that they provide students as influencing changes in capacity. For example, Elmore (2005) found that teachers often connect student learning with student characteristics and not their own teaching practices. Educators may perceive self-determination capacity as increasing simply because students are aging or because of outside factors (e.g., home influences). This may be further exacerbated when cognitive support technologies limit the degree to which teachers are engaging in direct instructional activities vs. providing students with supports that enable students to direct their own learning. Given past research suggesting that teachers do not feel adequately prepared in their preservice programs to teach self-determination (Mason, Field, & Sawilowsky, 2004), work is needed to enhance teacher skills and perceptions of their efficacy in promoting self-determination and in linking both direct instruction and supports to changes in capacity and opportunities.

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