


July 2023

The Effects of Joint Training on Career and Technical Education and Special Education Professionals

Crystal K. Emery
Utah State Board of Education

Robert L. Morgan
Utah State University

Follow this and additional works at: <https://digitalcommons.usu.edu/ddnj>

 Part of the [Adult and Continuing Education Commons](#), [Disability and Equity in Education Commons](#), [Disability Law Commons](#), [Secondary Education and Teaching Commons](#), and the [Vocational Education Commons](#)

Recommended Citation

Emery, Crystal K. and Morgan, Robert L. (2023) "The Effects of Joint Training on Career and Technical Education and Special Education Professionals," *Developmental Disabilities Network Journal*: Vol. 3: Iss. 2, Article 4.

Available at: <https://digitalcommons.usu.edu/ddnj/vol3/iss2/4>

This Article is brought to you for free and open access by the Journals at DigitalCommons@USU. It has been accepted for inclusion in Developmental Disabilities Network Journal by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



The Effects of Joint Training on Career and Technical Education and Special Education Professionals

Cover Page Footnote

We wish to thank the special education and career technical education teachers who participated in this study. Additionally, we are indebted to the state board of education and school administrators who assisted with this project.

The Effects of Joint Training on Career and Technical Education and Special Education Professionals

Crystal K. Emery¹ and Robert L. Morgan²

¹Utah State Board of Education, Salt Lake City, UT

²Utah State University, Logan, UT

Plain Language Summary

Young adults with disabilities who leave high school and enter adulthood often have challenges. They may be unable to find a job or go to college. Special education teachers may help. Vocational education teachers may also help. Unfortunately, special education and vocational education teachers do not often work together. This study looked at training special education and vocational education teachers to work together.

Abstract

Young adults with intellectual and/or developmental disabilities who leave high school have limited options in adulthood. Their rates of competitive employment in inclusive community settings are very low compared to their nondisabled counterparts. Involvement in postsecondary education and independent, community living is likewise limited. They need teams of trained professionals representing relevant disciplines who work together to support the student along college, career, and community pathways. Not only should special educators (SPED) be trained, but career technical education (CTE) professionals should be jointly trained in how to collaborate effectively and provide well-coordinated services. The purpose of this research was to explore the effects of joint training involving both CTE and SPED professionals on their knowledge and attitudes regarding collaboration in serving students with disabilities in the transition from high school to adulthood. Researchers evaluated pre- and post-measures of a joint training group (CTE plus SPED participants) and a control group. Results demonstrated increased knowledge of joint training group participants and improved attitudes about collaboration in comparison to control group participants. Qualitative analysis yielded four themes: (a) barriers to collaboration, (b) the important role of CTE, (c) the need for increased collaboration, and (d) the need to involve administrators and guidance counselors in collaborative efforts alongside SPED and CTE teachers. Authors discuss implications of results to improve collaboration.

We wish to thank the special education and career technical education teachers who participated in this study. Additionally, we are indebted to the state board of education and school administrators who assisted with this project.

Correspondence concerning this article should be addressed to Crystal Emery, Ph.D., SSIP and Post-Secondary Transition Specialist, Utah State Board of Education, 250 E 500 S., Salt Lake City, UT 84114. Email: crystal.emery@schools.utah.gov



CC BY-NC-SA 4.0

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License
<https://creativecommons.org/licenses/by-nc-sa/4.0/>
 Copyright © 2023 Authors

Introduction

Young adults with intellectual and/or developmental disabilities (IDD) such as autism or intellectual disability who exit from high school have limited options in adulthood. Whether they finish high school with a certificate of completion, special diploma, or full diploma, they face at least four impediments going forward. First, they are unlikely to succeed in community employment unless teams of trained professionals provide necessary supports (Trainor et al., 2019). Teams may consist of special education (SPED) teachers, career technical education (CTE) professionals, vocational rehabilitation counselors, school counselors, and others who address the needs of the specific individual (Barton-Arwood et al., 2016). Second, young adults with IDD are unlikely to meet the rigors of academic life in vocational schools or 2- or 4-year colleges without accommodations, although exceptions exist (Grigal et al., 2019). Third, entitlements offered by the Individuals with Disabilities Education Improvement Act (IDEIA, 2004) expire at age 22 in most states and do not address ongoing educational needs of adults with disabilities. Fourth, although some young adults with disabilities may be placed into employment with the assistance of vocational rehabilitation counselors and community rehabilitation provider agencies (Wehman et al., 2014), waiting lists are commonplace. Services may be delayed for years following exit from high school. To avoid these impediments, young adults with IDD need a strong support team leading to successful transition from school to adulthood.

One key ingredient to achieving improved postschool outcomes for students with disabilities may be collaboration between CTE and SPED professionals. Friend and Cook (2013) defined collaboration in educational settings as “a style of direct interaction between at least two co-equal parties voluntarily engaged in shared decision-making as they work toward a common goal” (p. 5).

Mazzotti et al. (2020) reviewed research literature and found that participation in CTE was a predictor of successful post-school outcomes for students with disabilities. Lee et al. (2016) demonstrated a relationship between concentration in CTE and successful post-school employment outcomes of adolescents with specific learning disabilities or emotional disturbance. Results showed that almost 62% of students with disabilities who concentrated in CTE in high school were employed full time 2 years following graduation compared to only 40% of students with disabilities who did not concentrate in CTE. Students with CTE concentration were also less likely to be unemployed or employed part time than their counterparts without such concentration.

Despite the potential benefits, Schmalzried and Harvey (2014) found that collaboration between CTE and SPED professionals was extremely limited. Based on the available literature (e.g., Eisenman et al., 2003; Lee et al., 2016; Schmalzried & Harvey, 2014), CTE and SPED professionals evidenced low levels of collaboration in serving students with disabilities. Lack of regular and consistent collaboration and limited time and opportunities for collaboration between CTE and SPED professionals were the norm (Eisenman et al., 2003). Lee et al. described the need for improved collaboration between SPED and CTE professionals to effectively support students with disabilities.

CTE was born out of the Carl D. Perkins Technical Education Improvement Act (2006) and earlier legislation to strengthen the focus on vocational and technical education. However, before and after the Perkins Act, CTE programs evidenced widely disparate utilization rates by students with IDD (Theobald et al., 2019). In many cases, CTE professionals reported inadequate training to support students with disabilities (Barton-Arwood et al., 2016). They also reported that SPED professionals lacked understanding of CTE processes and requirements when referring students to CTE (Barton-Arwood et al., 2016). Effective strategies for collaboration are needed among CTE and SPED professionals to better support students with disabilities in accessing work-based learning opportunities typically available through CTE.

Legislation Related to Students in Special Education

Legislation has influenced collaboration across professional disciplines in an effort to improve supports for secondary-age students with disabilities. Most notably, the Workforce Innovation and Opportunity Act (WIOA) of 2014 included the provision of pre-employment transition services (Pre-ETS). Pre-ETS are an important addition to services for students with disabilities because they provide access to work-based learning experiences, preferably in integrated employment settings (WIOA, 2014). WIOA states collaborate with local education agencies to provide Pre-ETS services, which has been most often interpreted as collaboration between SPED departments in a local education agency. However, this interpretation has not taken into consideration the provision of services in an integrated educational setting, such as CTE, to the maximum extent possible (Olson et al., 2016). Therefore, WIOA's policy shift toward full inclusion may raise issues given findings that CTE professionals sometimes have reservations about educating students with disabilities in general education classes (Barton-Arwood et al., 2016).

The IDEIA Transition Services Mandate (2004, C.F.R. 34 Â§ 300.43) outlined transition planning requirements for educators of students with disabilities. Student transition plans were required to identify post-secondary outcomes for employment and included multi-year courses of study that supported those outcomes. CTE concentration is defined as taking three or more high school credits in a single career pathway (Lee et al., 2016). Therefore, although collaboration barriers may need to be overcome, CTE concentration is a viable option for meeting the course of study requirement set out in IDEIA.

CTE and Students with Disabilities

Mazzotti et al. (2020) reported SPED teachers sometimes referred students with disabilities haphazardly to CTE without reference to occupationally specific CTE pathways. This concern is supported by Wagner et al. (2016), who found that participation in CTE credits in general did not affect post-school employment outcomes for students with specific learning disabilities, but credits focused on an occupationally specific CTE pathway did have a positive effect. Additionally, Wagner et al. found CTE teachers were hesitant to place students with disabilities in community work-based learning sites for fear of damaging existing relationships with employers that, in some cases, took considerable time and effort to develop. Involvement

of Vocational Rehabilitation (VR) counselors in this collaboration may mitigate the concerns of CTE teachers because they contract with relevant community service providers. VR is the state agency tasked with supporting individuals with disabilities in obtaining competitive integrated employment.

Need for Improved Collaboration

Schmalzried and Harvey (2014) emphasized the need for systematic collaboration between CTE and SPED professionals in order to facilitate successful student participation in CTE. According to the authors, professionals in both disciplines needed better understanding of their roles in the process. Their recommendations speak to the importance of effective communication and the critical nature of mutual understanding and collaboration across disciplines. Joint training with SPED and CTE teachers may be a crucial component to a successful collaboration process. Additional research is needed to identify the effects of joint training on knowledge gains and attitude shifts as SPED and CTE professionals serve students with disabilities.

Purpose Statement and Research Questions

The purpose of this study was to explore the effect of conducting joint training of CTE and SPED professionals. Joint training was defined as in-person education involving collaborative workgroups of CTE and SPED professionals. Collaborative work groups were defined as individual school teams with both CTE and SPED professionals meeting together to plan and set goals to improve collaboration within their individual school. Joint training content covered strategies and requirements for serving students with disabilities in educational settings and procedures and requirements for students concentrating in CTE (Schmalzried & Harvey, 2014). We hypothesized that joint training of CTE and SPED professionals would (a) increase participant knowledge of both disciplines, and (b) change attitudes regarding collaboration between disciplines. The research questions for this project were as follows.

1. To what extent will joint training improve participant knowledge of SPED and CTE roles and responsibilities for individuals on teams of CTE and SPED professionals?
2. To what extent will joint training improve participant attitudes towards collaboration between disciplines for individuals on teams of CTE and SPED professionals?

Methods

Participants

High schools from seven school districts and two charter high schools from a western state were invited to participate ($n = 23$ schools). We chose districts based on recommendations from colleagues in the state disability agency and the state board of education (L. Gripentrog, personal communication, September 20, 2018). We selected districts because administrators had acknowledged the importance of improving collaboration between SPED and CTE professionals,

thus making them prime candidates for the study. None of the districts had developed any systems or training programs to address their collaboration needs. Selection of these districts allowed the researchers to conduct the study in environments conducive to developing collaboration among its professionals while assessing knowledge and attitude change in the context of a systems change process (Fifield & Fifield, 2020).

We recruited participants in this study as “teams” of CTE and SPED professionals from each participating high school. Participants were enrolled as school teams because CTE courses and pathways were unique to each school. By participating as teams from individual high schools, the knowledge and collaboration exercises were relevant to the work that each team performed rather than providing general information that may not have been relevant in individual settings. Teams came from individual schools and consisted of three to six participants including both SPED and CTE professionals. The first author contacted district-level CTE and SPED directors and offered participation in the study. The directors then offered this opportunity to the schools under their supervision. Lead special education teachers at the school level worked with their colleagues in SPED and CTE to put together participating teams. The first author scheduled the training through the lead SPED professional at the school level. Educators participated on a strictly voluntary basis receiving no additional incentives.

Training groups consisted of CTE and SPED professionals receiving 3 hours of instruction delivered by the first author. Control groups consisted of CTE and SPED professionals from districts that were interested in the study but opted to not participate in the training because of previously established in-service training schedules. The first author systematically assigned teams to the training or control groups based on stated interest of the district administrators. The directors stating interest in the training group then offered participation to SPED and CTE teachers at the school level. The SPED and CTE directors stating interest in training but without options for training were offered participation in the control group (i.e., pre- and posttest only).

Of the 23 schools invited, five high school teams agreed to participate in the training group (four district teams and one charter high school team) with three to six members in each team. Demographics of participants are shown in Table 1. There were 20 participants in the training group including 11 from CTE and 9 from SPED. All but two participants were licensed to teach in the state with 12 having traditional and six having alternative routes to licensure. Participants in the training group had varied years of experience. Teams missing participants from either of the two professional areas were excluded.

The control group consisted of professionals from two school districts. Although the control group initially consisted of 25 participants who completed the pretest, nine did not complete the posttest. The remaining 16 participants in the control group completed both pre- and posttest measures and included nine from CTE and seven from SPED. All 16 participants were licensed to teach in the state with 14 having traditional licensure and two having alternative routes to licensure.

Table 1*Comparisons of Participants' Demographic Data*

Characteristic	Control (N = 16)		Training (N = 20)		p value
	n	%	n	%	
Gender					> .90
Male	7	44	8	40	
Female	9	56	12	60	
Age					.30
20-29 yrs	2	12	2	10	
30-39 yrs	6	38	2	10	
40-49 yrs	4	25	11	55	
50-59 yrs	3	19	3	15	
>59 yrs	1	6.2	2	10	
Experience					> .90
Less than 1 yr	2	12	3	15	
1-2 yrs	1	6.2	2	10	
3-5 yrs	3	19	3	15	
More than 5 yrs	10	62	12	60	
Discipline					> .90
CTE	9	56	11	55	
SPED	7	44	9	45	

Note. Statistical test performed: Chi-Square Test of Independence.

Training Sessions and Setting

Training consisted of 3 hours of instruction with additional time for questions as needed. The first author conducted training in a high school classroom or district office meeting space—whichever was most convenient for the participating teams. The space was set up with tables or desks for participants to gather around for collaboration. Three schools received the training in individual teams. One district brought two schools together to receive the training.

Dependent Variables

Dependent variables consisted of CTE and SPED knowledge and attitudes. We defined knowledge as scores on pretests and posttests measuring professionals' understanding of each discipline (the transition process for students with disabilities, CTE pathways, and college and career readiness planning) and understanding of the roles and responsibilities of SPED and CTE professionals. We defined attitudes as pre- and post-ratings of statements about professionals' views of interdisciplinary collaboration.

Response Measurement

The first author developed measures of knowledge and attitudes similar to those recommended by Schmalzried and Harvey (2014). We describe measures of knowledge,

attitudes, and inter-scorer agreement below.

Knowledge

To measure knowledge, the first author administered a pretest 1 week before the training with identical measures used for both SPED and CTE professionals. The pretest entailed 7 demographic questions and 10 knowledge questions. There were eight free response and two multiple-choice questions pertaining to knowledge about both disciplines. For example, free-response questions included “Name three things required to be in an Individualized Education Program (IEP) transition plan” and “Name two benefits of CTE completion in high school.” The two multiple choice questions addressed the roles of SPED and CTE professionals. At the conclusion of training, the first author administered a posttest with questions identical to the pretest presented in randomized order. The training group was not allowed to refer to their notes while taking the posttest. The first author administered the pretest and posttest to the control group sequentially 1 week apart without the intervening training activities. The control group was instructed to take both the pretest and posttest based on their current knowledge without referencing any external information or supports (e.g., the internet, other training materials).

Attitude Statements

To measure attitudes, the same procedure of administering pre- and posttests was followed with identical measures for the two disciplines. The pretest and matched posttest included eight statements regarding attitudes toward interdisciplinary collaboration in serving students with disabilities and consisted of the following.

1. General education teachers should attend and participate in IEP meetings.
2. Guidance Counselors should attend and participate in IEP meetings.
3. Students with disabilities should participate in CTE curricula alongside their typical peers in general education classes.
4. Students with disabilities typically have plans for education and paid employment after high school.
5. SPED teachers are primarily responsible for initiating communication regarding students with disabilities being served.
6. All disciplines are responsible for initiating communication regarding students with disabilities being co-served.
7. I have sufficient information to support students with disabilities in general education CTE pathways.
8. I am confident in participating in interdisciplinary collaboration to serve students with disabilities.

Each statement was rated using a 5-point scale ranging from *Strongly Agree (5)* to *Strongly Disagree (1)*. The posttest also included questions regarding the usefulness of the training.

Inter-Scorer Agreement

The first author created a master list of possible correct answers for the knowledge-based questions that was used as scoring criteria for the pre- and posttests. Next, the first author evaluated the knowledge-based answers on both the pre- and posttests by scoring each item “+” or “-.” Finally, the first author trained a second scorer to score 30% of the pre- and posttest answers using the identical scoring criteria for each question. Inter-scorer reliability was calculated by percentage agreement (i.e., agreements divided by agreements plus disagreements). Disagreement was defined as a difference in the two scores for each question. Inter-scorer reliability for knowledge questions was 97%. For the three free-response questions, inter-scorer agreement was 93%, 98%, and 81%, respectively. The lowest agreement occurred on a question asking participants to list two purposes of the College and Career Readiness Plan.

Fidelity of Training Implementation

The first author implemented training using procedures described below. Researchers developed a fidelity checklist to evaluate critical training components by ensuring that all training sessions contained the same information (see Figure 1). To ensure that all participants received the same information across training sessions, an independent observer used the checklist to score the first author for the presence of each item. Based on the observer’s checklist responses, fidelity averaged 11.25 out of the 12 fidelity items (93.8%).

Figure 1

Fidelity Checklist

Mark each item with yes or no.		
Yes	No	
<input type="checkbox"/>	<input type="checkbox"/>	1. Did the presenter greet participants and introduce the training?
<input type="checkbox"/>	<input type="checkbox"/>	2. Did the presenter administer the pretest before beginning the content of the training?
<input type="checkbox"/>	<input type="checkbox"/>	3. Did the presenter review training objectives?
<input type="checkbox"/>	<input type="checkbox"/>	4. Did the presenter define IDEA requirements for transition planning?
<input type="checkbox"/>	<input type="checkbox"/>	5. Did the presenter discuss accommodation and modification planning?
<input type="checkbox"/>	<input type="checkbox"/>	6. Did the presenter define requirements and processes for concentration in CTE pathways?
<input type="checkbox"/>	<input type="checkbox"/>	7. Did the presenter discuss how CTE pathway planning may inform the courses of study listed in a student’s transition plan?
<input type="checkbox"/>	<input type="checkbox"/>	8. Did the presenter converse and ask questions to encourage participant engagement?
<input type="checkbox"/>	<input type="checkbox"/>	9. Did the presenter facilitate the participation of school teams in a collaborative planning and goal-setting session?
<input type="checkbox"/>	<input type="checkbox"/>	10. Did the presenter offer time for questions and answers at the end?
<input type="checkbox"/>	<input type="checkbox"/>	11. Did the presenter administer the posttest at the end of the training?
<input type="checkbox"/>	<input type="checkbox"/>	12. Did the presenter close the training by thanking the participants?

Experimental Design and Procedures

A mixed methods design (Creswell & Clark, 2017) was implemented to evaluate the effects of joint training on the knowledge and attitudes of CTE and SPED professionals. The duration of the training was 3 hours. The training content covered strategies and requirements for serving students with disabilities in educational settings from SPED and general education perspectives. Collaborative planning and goal setting in individual school teams was also emphasized to support implementation of knowledge and attitudes acquired in the training.

Pretest

Before training began, participants completed a pretest measuring knowledge and attitudes as described above. The pretest was administered either in person or via email 1 week in advance of training. For the control group, the pretest was administered either in person or via email 1 week before the posttest. This spacing allowed for comparable amounts of time between the pre- and posttest for all groups. Participants who were emailed the pretest were instructed to complete it based on their current knowledge and not based on internet searches or other resources.

Training and Posttest

Following completion of the pretest, the first author conducted 120 minutes of training. Topics were chosen based on recommendations from previous researchers (Johnson et al., 2003; Schmalzried & Harvey, 2014) and included (a) barriers regarding lack of collaboration and how to overcome them, (b) knowledge allowing teachers to become better equipped to teach students with disabilities, and (c) knowledge of the roles and responsibilities of each discipline. Topics related to SPED included an overview of IDEIA (2004), legal language and regulations about carrying out services to students with disabilities in least restrictive environments, transition planning, and modifications and accommodations for students with disabilities. Topics related to participation in CTE included definitions of CTE pathways, procedure, and requirements for completing CTE pathways, work-based learning experiences, and College and Career Ready planning (Conley, 2010). Slides with discussion questions were interspersed throughout the presentation to offer participants opportunities to share with each other. Barriers to collaboration were listed by the teams in open discussion with one person in each team taking notes. The note taker for each team then emailed the notes to the first author for qualitative analysis. Training also emphasized strategies for CTE teachers to effectively communicate and set expectations for students with disabilities in their classroom. Finally, the teaming recommendations offered by Schmalzried and Harvey were presented as an introduction to collaborative goal-setting.

Following the training, the first author conducted a 40-minute collaborative planning and goal-setting session. Participants broke into individual school teams to discuss implementation strategies for improved collaboration within their school. A PowerPoint slide with three open-ended questions was displayed to generate team discussions. The questions were as follows.

1. What does communication and collaboration currently look like in your school?
2. What would communication and collaboration look like in an ideal world?
3. What first steps need to be taken to improve communication and collaboration in your school?

Each team discussed the communication and collaboration needs and improvement strategies in their school. One participant in each team took notes during the discussion. Once the planning session was complete, participants took 10 minutes to present their plans to the larger group, learn from others, and ask additional questions. The note taker from each team then emailed the notes to the first author for qualitative analysis.

The first author broke the 180-minute session into 120 minutes of training time (including the discussion of barriers), 40 minutes for collaborative planning and goal-setting, and 10 minutes to debrief in the larger group to allow the teams to share their plans, learn from others, and ask additional questions. The session ended with the 10-minute posttest. The notetaker emailed the notes on barriers and the plan from the collaborative workgroup to the first author for qualitative analysis. The training was offered to the control group districts after the study concluded.

Data Analysis

Primary Analyses

Data analyses included comparisons between the control and training groups for all outcomes. Analyses were completed in R version 3.6.2 (He et al., 2021). Data, code, and output of the quantitative analyses are provided at <https://osf.io/tkxzh>.

Baseline and pretest. To analyze the baseline demographic characteristics and pretest scores across both knowledge and attitudes, a series of non-parametric chi-square tests and Wilcoxon rank-sum tests were used. This analysis was conducted to determine similarities or differences between the control and training groups at the beginning of the study.

Joint training on knowledge and attitudes. Two research questions addressed how the training affected both knowledge and attitudes at posttest compared to the control group. To investigate changes in knowledge, a linear mixed effects model (a multilevel modeling approach) was used. Specifically, the model dependent variable was the knowledge score with the time point (pretest or posttest), group, and their interaction as independent variables. Researchers also controlled for intra-individual variability via a random intercept by individual. Probability (P) values were obtained via the Satterthwaite approximation to degrees of freedom (Kuznetsova et al., 2017). Results were also analyzed visually using a figure showing individual scores from pretest to posttest.

Given the ordinal scale of attitude measures, researchers used a series of non-parametric Wilcoxon rank-sum tests (Cuzick, 1985). First, the difference between the two groups at posttest was assessed. Second, the change from pretest to posttest was assessed for each group

separately. Together, these tests showed where differences existed between groups, and also for which measures either group demonstrated significant changes from pretest to posttest. Researchers used a Sankey diagram (Sankey et al., 2010) to show visual patterns of change from pretest to posttest for individual participants.

Secondary Analyses

A secondary analysis was undertaken because, in the course of performing the primary analyses, researchers found certain patterns in the data. Specifically, the analysis yielded differences between CTE and SPED knowledge data.

Differences in pretest, change from pretest to posttest, and posttest scores were compared within training groups for the CTE and SPED participants. First, to test for differences at pretest, researchers used an independent sample *t* test with knowledge scores at pretest as the dependent variable. Next, to test for differences in changes from pretest to posttest, again, researchers used linear mixed effects models similarly as done in the primary analysis. Third, researchers used another independent samples *t* test to look for differences in posttest scores.

Qualitative Analysis

Several questions were posed for group discussion among school teams to gather qualitative information regarding collaboration. Each school team was instructed to take notes during discussions. Notes were then submitted to the researchers for analysis. The first author posed several questions for open discussion. The discussions were not recorded, but the first author took field notes during the discussions and gathered the written notes from each team. Using thematic analysis (Creswell et al., 2006), researchers examined field notes and team notes to find identical or similar themes. The researchers independently identified themes and then met to compare results and identify common themes.

Results

Results are divided into Primary Analyses, Secondary Analyses, and Qualitative Results. Primary Analyses includes baseline and pretest data, effects of joint training on knowledge, and effects of joint training on attitudes. Secondary analysis examines potential differences within the training group as a function of individual disciplines. Qualitative Results are divided into barriers to collaboration, CTE educators playing an important role in supporting goals of students, training together to build collaboration, and administrators and guidance counselors supporting training efforts. These data are presented below.

Primary Analyses

Baseline and Pretest

Table 1 presented the characteristics of SPED and CTE participants. There were no statistically significant differences in any characteristic between the groups ($p > .30$) nor were there differences between the groups for any knowledge or attitude pretest scores ($p > .30$).

Effect of Joint Training on Knowledge

Linear mixed effects modeling demonstrated a significant interaction between time point and group ($p < .001$), suggesting that the change over time depended on the group in which the individual participated. Specifically, joint training produced a significant increase in knowledge scores for CTE and SPED professionals compared to professionals in the control group (see both Table 2 and Figure 2). Specifically, Figure 2 presents individual scores from pretest to posttest. Although starting at a similar level, participants in the training group consistently increased knowledge from pretest to posttest while the control participants did not.

Table 2

Estimates from the Linear Mixed Effects Model (Dependent Variable = Knowledge Scores)

Variables	Estimates
Training (compared to Control)	5.81***
Time	5.28***
Interaction (Training x Time)	-6.09***
Constant	5.13***
Residual Variance	2.92

*** $p < .001$.

Effect of Joint Training on Attitudes

There were eight individual measures regarding attitudes toward interdisciplinary collaboration in serving students with disabilities. These measures each had an ordinal distribution; as such, non-parametric Wilcoxon rank-sum tests were used to identify statistically significant differences. First, the tests for differences between groups at posttest showed five significant differences (see Table 3; all p values $< .047$). In each, the difference between the groups was because of the improvement in the training group. Further, Wilcoxon rank-sum tests were used to assess change from pretest to posttest for each group separately for each attitude measure. Only the training group showed any significant change from pretest to posttest (see Table 3). Specifically, five statements were statistically significant, all showing change in attitude

Figure 2

Knowledge Scores from Pretest to Posttest for Individual Participants in the Control Group and Training Group

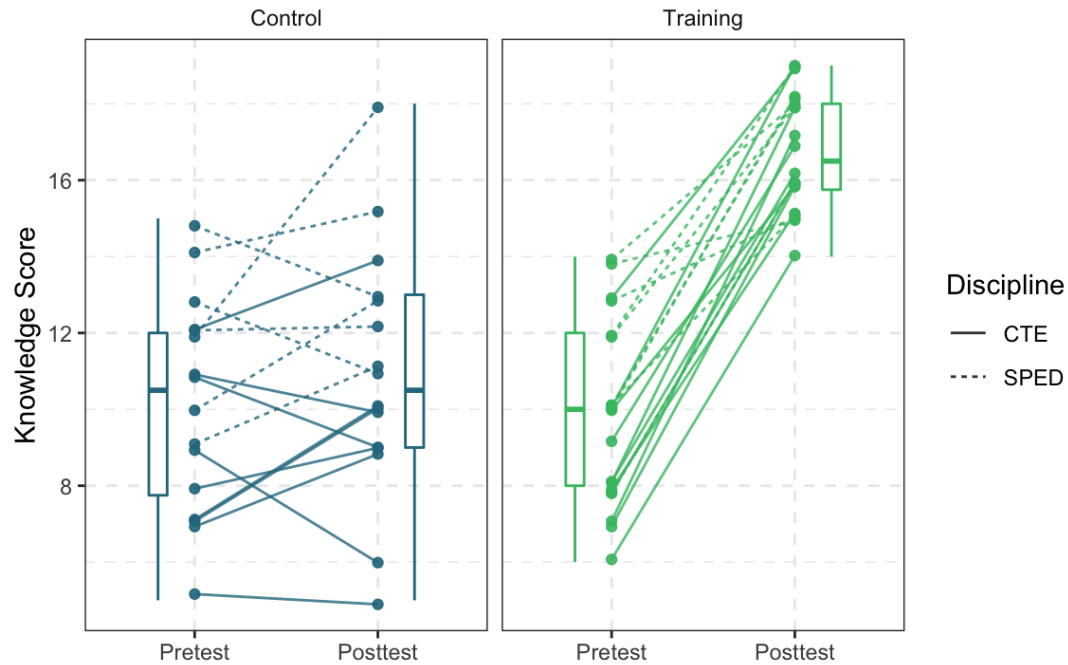


Table 3

Results of the Wilcoxon Rank-Sum Tests for the Attitude Measures: Comparisons from Pretest to Posttest

Attitude measure	Comparison of groups		Training group		Control group	
	W	P value	W	P value	W	P value
Statement (S)1	150	.676	170	.302	105.5	.320
S2	96	.023*	157	.179	150	.382
S3	108	.047*	112	.007**	153	.290
S4	121.5	.209	125	.038	92	.157
S5	184	.098	240.5	.242	69.5	.053
S6	137.5	.383	90	.001***	102.5	.291
S7	96	.027*	99	.002**	132	.888
S8	89.5	.018*	125	.027*	125.5	.937

* $p < .05$.

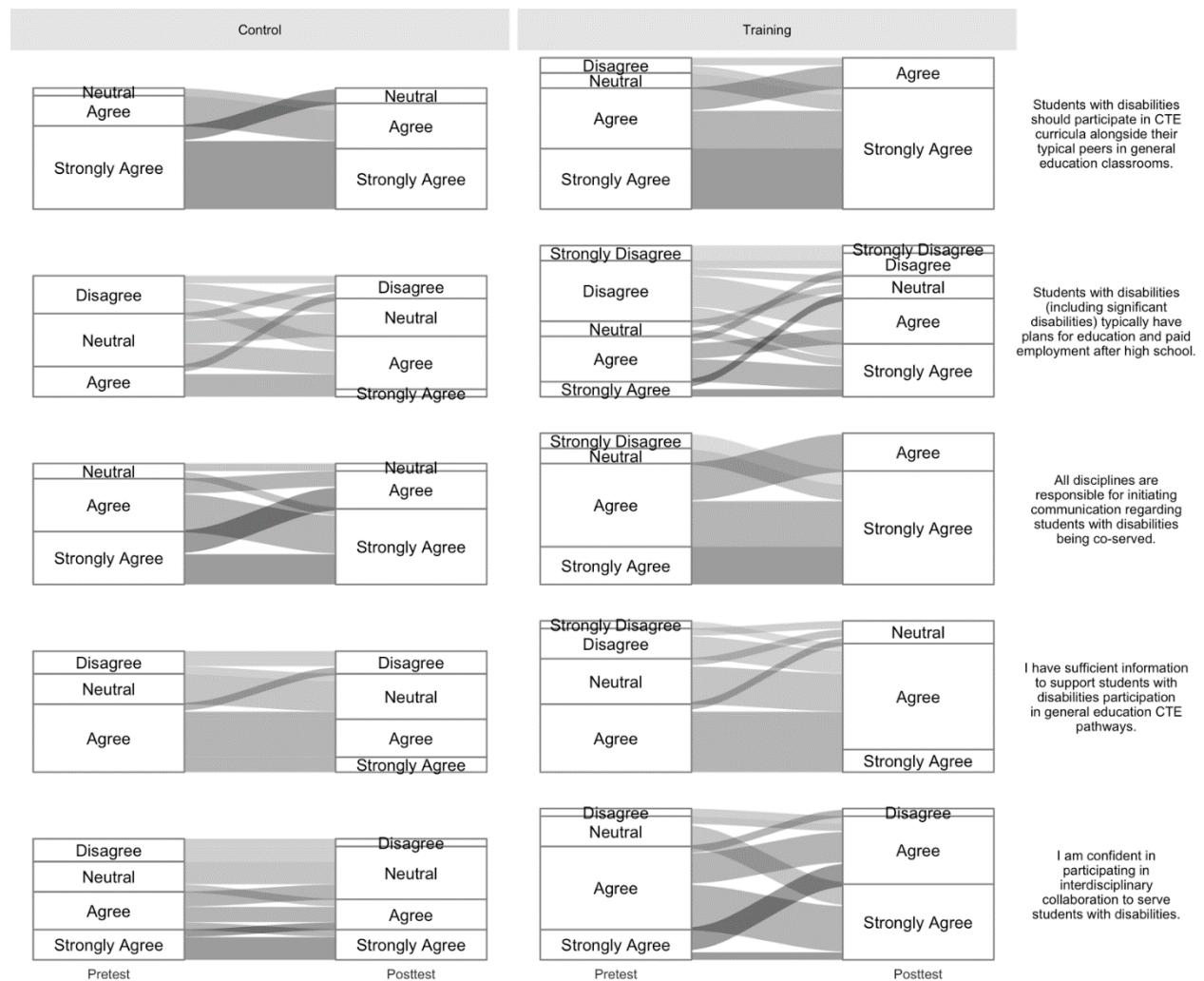
** $p < .01$.

*** $p < .001$.

from pretest to posttest. Figure 3 highlights the changes from pretest to posttest for each of the five statistically significant statements. Statements are listed on the far right of the figure. Under the Control and Training Groups, information on the left refers to pretest and information at right refers to posttest. Changes from pretest to posttest are shown by the nonhorizontal lines and the proportion of total group participants who changed their ratings. For example, for the “Students with disabilities should participate in CTE curricula alongside their typical peers in general education classrooms” attitude measure, 80% of the training group at pretest agreed or strongly agreed. At posttest, all 20 participants agreed or strongly agreed in that group. For the control group, nearly 94% at pretest agreed or strongly agreed. At posttest, agreement or strong agreement decreased slightly to 87.5%.

Figure 3

Changes from Pretest to Posttest for Control and Training Group Participants on Attitude Measures



The posttest questions regarding the usefulness of the training revealed that 55% of participants rated the training as “useful” and 45% rated it as “very useful.” When asked if participants would recommend this training to colleagues, 19 answered yes and 1 did not respond. All participants left with one or two ideas for improving their collaboration practices. Examples included:

- “I will be more comfortable approaching SPED teachers with questions.”
- “I will work more with CTE to design a career pathway for SPED students.”
- “Giving more details for IEPs” (CTE teacher).
- “I will help students enter and complete CTE pathways.”

Secondary Analysis

The secondary analysis assessed potential differences within the training group based on the individual disciplines (SPED or CTE). First, there were differences at pretest, $t(16.6) = -3.22$, $p = .005$, with the SPED group ($M = 11.4$) having higher average scores than the CTE group ($M = 8.5$). The CTE group increased their scores proportionately higher than the SPED group from pretest to posttest ($p = .01$), ultimately showing no differences by discipline at posttest (SPED $M = 16.9$; CTE $M = 16.6$), $t(16.9) = -0.35$, $p = .729$.

Qualitative Results

Group notes yielded four themes: (a) barriers to collaboration, (b) the important role of CTE in meeting postsecondary employment goals of students, (c) the need for increased collaboration across disciplines, and (d) the need to involve administrators and guidance counselors in collaboration. These themes are described below.

Barriers to Collaboration

All groups noted barriers to collaboration. Thematic analysis revealed three subthemes to collaboration: (a) lack of time to collaborate, (b) poor communication, and (c) lack of professional development. These themes coincided with barriers identified by Schmalzried and Harvey (2014). Participants attributed lack of time to limitations in contract time, large class sizes, IEPs offered during the day while CTE teachers were in class and unable to attend, short preparation periods, and heavy expectations from administration.

Participants attributed poor communication largely to lack of time. One teacher summed up the sentiment by saying, “Communication happens reactively, not proactively in our school.” No school team had clear consistent systems for proactively communicating about students they co-served. Another element of poor communication was that professionals in each discipline tended to “stay to themselves” rather than work as a collaborative group.

Finally, participants consistently identified lack of cross-discipline professional development as a barrier. Participants reported that their schools did not have systems in place

to provide sufficient professional development across disciplines. Teachers with less than 2 years of experience discussed feeling like they had to fend for themselves to learn all they needed to support their students. A barrier to inclusion expressed by some CTE teachers was lack of training on how to work with students having disabilities. Adding a student with a disability to a CTE class without training in how to support them was considered overwhelming for the teachers. Participants attributed the paucity of professional development to lack of time and administrative support.

Role of CTE Educators in Supporting Employment Goals for Students

Several CTE professionals expressed feeling validated as a result of this training. Working with students in vocation-focused education, CTE professionals reported feeling like they were viewed as less important than teachers supporting a college-bound track. In their view, this training validated their work in vocationally focused education. When asked how CTE pathways could support PRE-ETS requirements, several participants stated “CTE is PRE-ETS!” and “these [SPED] kids need CTE pathways the most.” Both disciplines expressed their interest in CTE pathways for students with disabilities. All school team discussions included notes about working together across disciplines to get students with disabilities into pathways that would serve them well.

Collaboration Across Disciplines

One of the most consistent themes emerging from the group discussion was the need for increased collaboration across disciplines. Several participants expressed gratitude for the time and opportunity for joint training. Many individuals reported that reaching out to communicate more frequently and deliberately was something they could change in their own practice. A sense of camaraderie was observed during training and playful enthusiasm sparked meaningful discussion between disciplines where there had been little or no communication previously.

One school team was impressed with the importance of having CTE input more deliberately included in IEPs. A SPED teacher in that group stated,

We don't want the student to define their goals as a special ed student. We want them to define their goals as a whole student and we can't do that without participation of gen ed teachers in IEPs.

They discussed how CTE teachers see a different side of students than traditional academic teachers and those observations are missing from student IEPs. That team recommended editing their teacher input form for IEP preparation to include questions specific to CTE teachers for the purpose of gathering a more complete picture of a student. One participant commented that spending the training together and getting to know each other would make it easier to reach out for collaboration in the future. Multiple participants commented that the training had formed a bridge between the two disciplines that did not previously exist.

Another subtheme was the concept that SPED and CTE could be resources to each other

in serving students with disabilities. All four training groups recommended regularly scheduled interdisciplinary meetings as their first steps toward improved collaboration in their school. CTE teachers invited SPED to come into their Professional Learning Community meetings to offer training in working with students with disabilities.

Administrators and Guidance Counselors as Stakeholders in Training

A common theme in all group discussion was that school teams needed administrators and guidance counselors to be involved. One CTE teacher stated,

Administration and guidance counselors need to understand everyone's roles better. A system change is required to really improve services for students with disabilities in high school.

The charter school especially had system and administration barriers to effective use of CTE. The teachers questioned, "How do charter schools or schools with limited resources access CTE funding or help students access CTE pathways?" The charter school team committed to researching this issue further.

Discussion

In this study, researchers evaluated the effects of joint CTE and SPED training on individual team members' knowledge and attitudes of both disciplines. Results demonstrated that joint training with CTE and SPED professionals increased knowledge of all participants and improved attitudes about collaboration between disciplines. In addition, information in the training content on both disciplines ensured that participants had a clear and common understanding of each discipline's roles and responsibilities. This effect was shown in the decreased knowledge discrepancy between disciplines on the posttest. The effect was also manifested in discussion between groups during the training as representatives of each discipline acted as a knowledge resource to the other. Joint training appeared to clarify roles and responsibilities of the other discipline.

The changes in attitudes were consistent across groups. Both groups started with more positive attitude ratings than anticipated by the researchers so there was not as much room for change as expected. This supports the finding of Morgan (2015), who found that many professionals support inclusion as a philosophy but are unsure how to implement it in practice. As stated by Sturko and Gregson (2009), improved attitudes toward collaboration seemed to result from professionals creating a sense of network and community as they worked in interdisciplinary teams.

Participants from both disciplines increased their knowledge significantly with the strongest increase coming from CTE professionals. This is likely because CTE professionals tended to score lower on the pretest than SPED professionals. Also noteworthy was the decrease in knowledge disparity between disciplines on the posttest for the training group. Knowledge scores

were significantly different between disciplines on the pretest but not significantly different on the posttest. This “coming together” in knowledge and understanding of roles and responsibilities aligned with the positive feelings expressed by several participants regarding the collaboration process.

Implications for Practice

Given that this study demonstrated that joint training with CTE and SPED professionals resulted in increased knowledge and attitudes, this collaborative approach may serve as a valuable tool for professionals who support students with disabilities in high school settings. Improved communication and collaboration between the disciplines may create a positive working relationship among professionals and result in smoother and more comprehensive transition experiences for the students they serve.

Implications for Research

Although this study demonstrated the benefit of joint training of CTE and SPED professionals, the barriers to collaboration likely remain with some administrators and school systems. Schmalzried and Harvey (2014) found that most front-line staff were often willing to collaborate but did not have systems in place to do so. They suggested that administrators put those collaborative systems and expectations in place. Future researchers should examine the benefit of including administrators as well as school counselors as primary stakeholders in collaborative teams. Administrators need to put the systems in place and set expectations for performance of school personnel (Schmalzried & Harvey, 2014). If systems and expectations do not support inclusive practices and collaboration, then training front-line staff may not have the intended impact on these practices.

Another important area of future research may be exploring the impact of joint training on actual collaborative practices in student transition planning. In this study, no follow-up data were collected on the extent to which collaboration training was associated with actual changes in student planning. If the improved knowledge and attitudes alone do not change practice, it will be important to identify additional supports such as coaching to help practitioners incorporate this new knowledge into their daily practice.

Finally, it is important for future researchers to assess the effect of successful interdisciplinary training and collaboration on student transition outcomes. Will improved relationships between professionals in the transition process lead to improved outcomes for the students? The answer awaits future research.

Limitations

Two limitations of this research are noteworthy. One limitation was the small sample size of school teams participating. Given the small sample, joint training effects may not be generalized to personnel in other schools or districts. Similarly, these results may not generalize

to teams in other parts of the U.S. Future researchers may want to consider utilizing a larger sample size in multiple locations.

A second limitation was the lack of systematic random assignment of participating teams to training conditions. Although we attempted to be as objective as possible, nonrandom assignment may have created bias among researchers or participants in terms of expected responses (Nilsen et al., 2013). Self-selected participants may have had a bias toward wanting to improve knowledge because they chose to participate in the training. Future researchers should consider random assignment of teams.

Conclusion

Results of this study demonstrate that relatively brief joint training can produce improvements in knowledge and attitudes regarding the roles of professionals in CTE and SPED. Participants emerged from the training group understanding the other discipline while experiencing a connection in service to the student. Although future research is needed, increased collaboration and improved attitudes between CTE and SPED professionals may positively impact delivery of services. The ultimate benefactors may be students with disabilities who receive better coordinated services leading to improved post-school outcomes.

References

- Barton-Arwood, S., Lunsford, L., & Suddeth, S. W. (2016). University-community partnerships in teacher preparation: Changing attitudes about students with disabilities. *Journal of Public Scholarship in Higher Education, 6*, 4-20.
- Carl D. Perkins Career Technical Education Improvement Act of 2006, 20 U.S.C. 2301 et seq. as amended P.L. 109-270.
- Conley, D. T. (2010). *College and career ready: Helping all students succeed beyond high school*. John Wiley & Sons. <https://DOI: 10.1002/9781118269411>
- Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.
- Creswell, J. W., Shope, R., Plano Clark, V. L., & Green, D. O. (2006). How interpretive qualitative research extends mixed methods research. *Research in the Schools, 13*(1), 1-11.
- Cuzick, J. (1985). A Wilcoxon-type test for trend. *Statistics in Medicine, 4*(1), 87-90. <https://DOI: 10.1002/sim.4780040112>
- Eisenman, L., Hill, D., Bailey, R., & Dickison, C. (2003). The beauty of teacher collaboration to integrate curricula: Professional development and student learning opportunities. *Journal of Vocational Research, 28*(1), 85-104. <https://DOI: 10.5328/JVER28.1.85>

- Fifield, B., & Fifield, M. G. (2020). The origins of University Centers on Developmental Disabilities: Early expectations and legislation. *Developmental Disabilities Network Journal*, 1(1), 15-33. <https://DOI.org/10.26077/y5em-e046>
- Friend, M., & Cook, L. (2013). *Interactions: Collaboration skills for school professionals* (7th ed.). Pearson.
- Grigal, M., Papay, C., Smith, F., Hart, D., & Verbeck, R. (2019). Experiences that predict employment for students with intellectual and developmental disabilities in federally funded higher education programs. *Career Development and Transition for Exceptional Individuals*, 42(1), 17-28. <https://DOI: 10.1177/2165143418813358>
- He, J., Guo, Y., Mao, R., & Zhang, J. (2021). Proportion of asymptomatic coronavirus disease 2019: A systematic review and meta-analysis. *Journal of Medical Virology*, 93(2), 820-830. <https://DOI:10.1002/jmv.26326>
- Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. §§ 1401 et seq. (2004).
- Johnson, L. J., Zorn, D., Tam, B. K. Y., Lamontagne, M., & Johnson, S. (2003). Stakeholders' views of factors that impact success interagency collaboration. *Exceptional Children*, 69(2), 195-209. <https://doi.org/10.1177/001440290306900205>
- Kuznetsova, A., Brockhoff, P. B., & Christensen, R. H. B. (2017). ImerTest package: Tests in linear mixed effects models. *Journal of Statistical Software*, 82(13), 1-26. <https://DOI: 10.18637/jss.v082.i13>
- Lee, I. H., Rojewski, J. W., & Gregg, N. (2016). Causal effects of career-technical education on postsecondary work outcomes of individuals with high-incidence disabilities. *Exceptionality*, 24(2), 79-92. <https://DOI: 10.1080/09362835.2014.986608>
- Mazzotti, V. L., Rowe, D. A., Kwiatek, S., Voggt, A., Chang, W. H., Fowler, C. H., Poppen, M., Sinclair, J., & Test, D. W. (2020). Secondary transition predictors of postschool success: An update to the research base. *Career Development and Transition for Exceptional Individuals*, 39(4), 196-215. <https://DOI:10.1177/2165143420959793>
- Morgan, P. S. (2015). General and special education high school teachers' perspectives of full membership for students with disabilities. *Values and Ethics in Educational Administration*, 11(3), 1-9. <http://www.ucea.org/initiatives/ucea-centre-study-leadership-ethics/>
- Nilsen, R. M., Surén, P., Gunnes, N., Alsaker, E. R., Bresnahan, M., Hirtz, D., Hornig, M., Lie, K. K., Lipkin, W. I., Reichborn-Kjennerud, T., Roth, C., Schjolberg, S., Smith, G. D., Susser, E., Vollset, S. E., Oyen, A., Magnus, P., & Stoltenberg, C. (2013). Analysis of self-selection bias in a population-based cohort study of autism spectrum disorders. *Paediatric and Perinatal Epidemiology*, 27(6), 553-563. <https://DOI: 10.1111/ppe.12077>
- Olson, A., Leko, M. M., & Roberts, C. A. (2016). Providing students with severe disabilities access to the general education curriculum. *Research and Practice for Persons with Severe Disabilities*, 41(3), 143-157. <https://DOI: 10.1177/1540796916651975>

- Sankey, M., Birch, D., & Gardiner, M. (2010). Engaging students through multimodal learning environments: The journey continues [Conference session]. In *Proceedings ASCILITE 2010: 27th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education: Curriculum, Technology and Transformation for an Unknown Future* (pp. 852-863). University of Queensland. https://research.usq.edu.au/download/9e1000fbe4def7f47f4ffb089eab6eafdab6bdfc7ac58b59a1ea99c6bcc303fa/394459/Sankey_Birch_Gardiner_Ascilite_2010_PV.pdf
- Schmalzried, J. E., & Harvey, M. W. (2014). Perceptions of special education and career and technical education collaboration and communication. *Career Development and Transition for Exceptional Individuals*, 37(2), 84-96. [https://DOI: 10.1177/2165143412467666](https://DOI:10.1177/2165143412467666)
- Sturko, P. A., & Gregson, J. A. (2009). Learning and collaboration in professional development for career and technical education teachers: A qualitative multi-case study. *Journal of Industrial Teacher Education*, 45(3), 34-60. <https://ir.library.illinoisstate.edu/jste/vol45/iss3/5>
- Theobald, R. J., Goldhaber, D. D., Gratz, T. M., & Holden, K. L. (2019). Career and technical education, inclusion, and postsecondary outcomes for students with learning disabilities. *Journal of Learning Disabilities*, 52(2), 109-119. <https://DOI:10.1177/0022219418775121>
- Trainor, A. A., Carter, E. W., Karpur, A., Martin, J. E., Mazzotti, V. L., Morningstar, M. E., Newman, L., & Rojewski, J. W. (2019). A framework for research in transition: Identifying important areas and intersections for future study. *Career Development and Transition for Exceptional Individuals*. <https://DOI:10.1177/2165143419864551>
- Wagner, M. M., Newman L. A., & Javitz, H. S. (2016). The benefits of high school career and technical education (CTE) for youth with learning disabilities. *Journal of Learning Disabilities*, 49(6), 658-670. <https://DOI:10.1177/0022219415574774>
- Wehman, P., Schall, C., Carr, S., Targett, P., West, M., & Cifu, G. (2014). Transition from school to adulthood for youth with autism spectrum disorder: What we know and what we need to know. *Journal of Disability Policy Studies*, 25(1), 30-40. [https://DOI: 10.1177/1044207313518071](https://DOI:10.1177/1044207313518071)
- Workforce Innovation and Opportunity Act, P.L. 113-128, 29 U.S.C. §§ 3101, Title IV Subtitle B Section 422 (2014).