

A Synthesis of Literature Examining the Structured Teaching Components of the TEACCH Model Employing the Use of a Visual Conceptual Model

Karin Kliemann

University of North Texas

A synthesis of research on the TEACCH Model was conducted to determine which components of Structured Teaching under the TEACCH model meet criteria as evidenced based practices using the Reichow, Volkmar, and Cicchetti criteria (2007) along with reporting on the findings of the National Autism Center report (2009). The critical components of the Structured Teaching approach under the TEACCH model as defined by Schopler et al. (1995) are: physical structure; visual schedules; work systems; and task organization. Our analysis found visual schedules met the Reichow et al. (2008) criteria and a case can be made for task organization. A secondary purpose of the synthesis was to visually represent the integration and separation of what researchers mean when they refer to the implementation of the TEACCH model. Components of the Structured Teaching approach under the TEACCH model along with the TEACCH philosophy /model are depicted using a proposed conceptual model.

Keywords: environmental supports, structured teaching, TEACCH, autism, visual systems, work systems, task organization.

The purpose of this synthesis is to ascertain if research on the four components of the Structured Teaching approach under the TEACCH model as defined by Schopler, Mesibov, & Hearsey (1995) meets the criteria for an evidenced-based practice according to the rating system developed by Reichow, Volkmar, & Cicchetti (2007) and the National Autism Center report (2009). The critical components of the Structured Teaching approach under the TEACCH model are:

physical structure, which specifies how the environment is organized; visual schedules, which specify how visual information is used to depict events and activities within the day; work systems, which specify how information is visually communicated about what to do; and task organization, which specifies how steps of activities are presented visually (Schopler et al., 1995).

A review of the research literature revealed the existence of multiple diverse, yet overlapping definitions of what

researchers conclude as philosophy versus components in the implementation of the TEACCH model. Due to these findings, it was determined that a visual model or conceptual framework would further qualify and categorize the current research on the TEACCH model. The conceptual model is described below.

Visual Conceptual Model of TEACCH Philosophy and Structured Teaching Components

Historical Background

The TEACCH model is a compilation of services ranging from clinical services for children, young adults, and families to professional development, and training programs. Since the inception of the TEACCH model, the concept of *structure* has been the fundamental approach to teaching children with autism. Schopler and colleagues focused their intervention efforts on providing highly structured settings for learning (Mesibov, Shea, & Schopler, 2005). Over the last 40 years, the concept of *structure* has evolved and the TEACCH model is often used interchangeably with the term Structured Teaching (Bennett, Reichow, & Wolery, 2011; Hume & Odom, 2007; Iovannone, Dunlap, Huber, & Kincaid, 2003; Mesibov, Shea, & Schopler, 2005; Taylor & Preece, 2010). A secondary purpose of this paper is to provide readers a conceptual model to differentiate the TEACCH model philosophy from the components of Structured Teaching in an effort to bridge the research to practice gap by clarifying the components and discussing them within an evidenced based framework.

Method

To identify relevant research reports, an electronic search of the following databases was conducted:

Educational Research Complete; ERIC; Medline Professional Development Collection; PsycARTICLES; PsycInfo; Psychology & Behavioral Sciences; Social Sciences; and TOPICsearch. The terms used for the initial search were *structure, culture of autism, environmental supports, structured teaching, TEACCH, visual systems, work systems, teaching methods, student motivation, and task organization*.

This initial query resulted in 51 articles for possible review. Of the articles located, only 19 met the final inclusionary criteria established for this review. Studies employed were published from 1998 to 2011; with eight studies being from 2009 to 2011. All studies were published in peer-reviewed journals.

Inclusionary Criteria

The inclusion criteria, determined by the author, included only studies that (1) had a specific reference to the TEACCH model or Structured Teaching; (2) the research specifically targeted at least one participant with autism whose age ranged from preschool through adulthood; (3) the intervention described in the study focused on at least one or more of the components of the Structured Teaching under the TEACCH model; (4) article must have been published in a peer reviewed journal; and (5) the research design and procedures described in the article were experimental in nature.

The geographic location of the research was not a factor if the study met inclusionary criteria. Two of the studies in the final analysis, Panerai, Ferrante, Cuputo, and Impellizzeri, (1998), and Taylor, and Preece (2010), were not specific to participants with autism, but met the criteria for inclusion for using Structured Teaching or the TEACCH model as a foundation. Panerai et al. (1998) included participants who were diagnosed with

profound intellectual disabilities. Taylor and Preece (2010) included participants with multiple disabilities and visual impairments.

Settings included both classroom and residential environments. Countries included: United States; China; Greece; and Italy. Implementers of the interventions included: teachers; researchers; parents; and residential caregivers. Interventions addressed dependent variables of: *increased on task behaviors, increased independence, increased communication, following directions, and overall increase in adaptive social functioning.*

Exclusionary Criteria

The author excluded articles that did not present findings from single subject, or group design, or did not discuss the TEACCH model or the Structured Teaching components (Banda, Grimmer, & Hart, 2009; Breifelder, 2008; Fittipaldi-Wert & Mowling, 2009; Iovannone, Dunlap Huber & Kincaid, 2003; Meadan, Ostrosky, Triplet, Mirchna & Fettig, 2011; McGuire & Michalko, 2011; Rao & Gagle, 2006; Vaca, 2007). Articles reporting findings using case study only were also excluded as case studies are not currently recognized as an experimental methodology (Kazdin, 2011). Furthermore, articles that did present findings using the afore mentioned designs were excluded if the strategies investigated did not specifically mention the TEACCH model or Structured Teaching as a foundation for content (Boyd, Alter & Conroy, 2005; Klin, Danovitch, Merz, & Volkmar, 2007; Dettmer, Simpson, Myles, & Ganz, 2000; Koegal, Singh, & Koegal, 2010; Murdock & Hobbs, 2011).

Of the 51 articles, eight were excluded for not being research based. Five articles were excluded for not specifically addressing the TEACCH model or the Structured Teaching components even

though the research was of sound design. Four articles were kept in the final analysis despite lacking a research design, considering that the discussion of the TEACCH model or Structured Teaching components were a foundation of the content.

Results

Four Components of Structured Teaching

Nineteen articles were reviewed for the current literature synthesis. The studies included 66 students, most with a diagnosis of autism. However, two studies included students with non-autism diagnoses. The studies will be discussed individually under the four components of Structured Teaching, as depicted under the *structure* tenet of the *overarching philosophy* of TEACCH model. Each section will follow the same format for discussion, beginning with a definition and statement of purpose for each individual component. The next sections will summarize the research on the individual component and whether that component meets criteria as an evidenced based practice based on either the National Autism Centers (NAC, 2009) report or Reichow et al. (2007) criteria for establishing an evidence based practice.

A search of the literature revealed that some researchers have combined the work of Schopler et al. (1995) and Mesibov, Shea, and Schopler (2004), leading to the TEACCH model being understood from two separate paths. Mesibov and Shea (2010) discuss implementing the TEACCH model through the "Culture of Autism" understanding. For this study the 'Culture of Autism' is defined as an overarching philosophical approach that serves a more global view of how persons approach intervention with those who carry a diagnosis of autism. These patterns of deficits and strengths include a) strength

and preference in processing visual information and heightened attention to detail, b) impairment in initiating communication and social communication, c) very intense interests and impulses to engage in favored activities, and d) difficulty with concepts of time, beginning and endings, along with a tendency to become attached to routines (Mesibov & Shea, 2010). The TEACCH model implemented from the overarching philosophy view is reflected in the literature by planning holistically for a person diagnosed with autism by: (a) focusing on the strengths and interests of the person with autism, (b) ongoing assessment, (c) assistance in helping persons with autism understand and get meaning from the environment, (d) problem solving assistance to prevent non-compliance, and (e) parent collaboration (Howley, Preece, & Arnold, 2001; Mesibov & Shea, 2012; Ozonoff, & Cathcart, 1998; Short, 1984).

The other research path focused on the implementation of the TEACCH model though the application of four components typically described in the literature under the philosophical tenet of *structure*. Schopler et al. (1995) first used the term Structured Teaching to describe the organization of space, time, and sequences of events within the environment in order to make tasks easier to perform. See figure 1 for an illustration of the TEACCH model

philosophy and the four components of Structured Teaching.

Work is still needed to further clarify what is meant when researchers say the TEACCH model, as Mesibov and Shea (2010) complicate matters when they state “the TEACCH approach is called “Structured Teaching.” Mesibov and Shea (2010) then describe Structured Teaching based on the above tenets of the overarching philosophy, yet further in their article, it states that TEACCH generally recommends four types of structure and the authors describe the four components first identified by Schopler et al. (1995). Researchers using the four components: physical /environmental structure; daily structure in the form of visual schedules; work systems; and task organization discuss them as being contained under the *structure* tenet of the TEACCH model (Carnahan, Harte, Dyke, Hume, & Borders, 2011; Ganz, 2007; Hume & Odom, 2007; Iovannone, Dunlap, Huber, & Kincaid, 2003; Mesibov & Shea, 2011; Mesibov et al., 2005; Panerai, Ferrante, & Zingale, 2002; Panerai, Zingale, Trubia, Finocchiaro, Zuccarello, Ferri, & Elia, 2009; Schopler et al., 1995; Taylor & Preece, 2010). The conceptual model is offered to assist in more clearly understanding the TEACCH model both from an overarching philosophical understanding and a Structured Teaching component specific path.

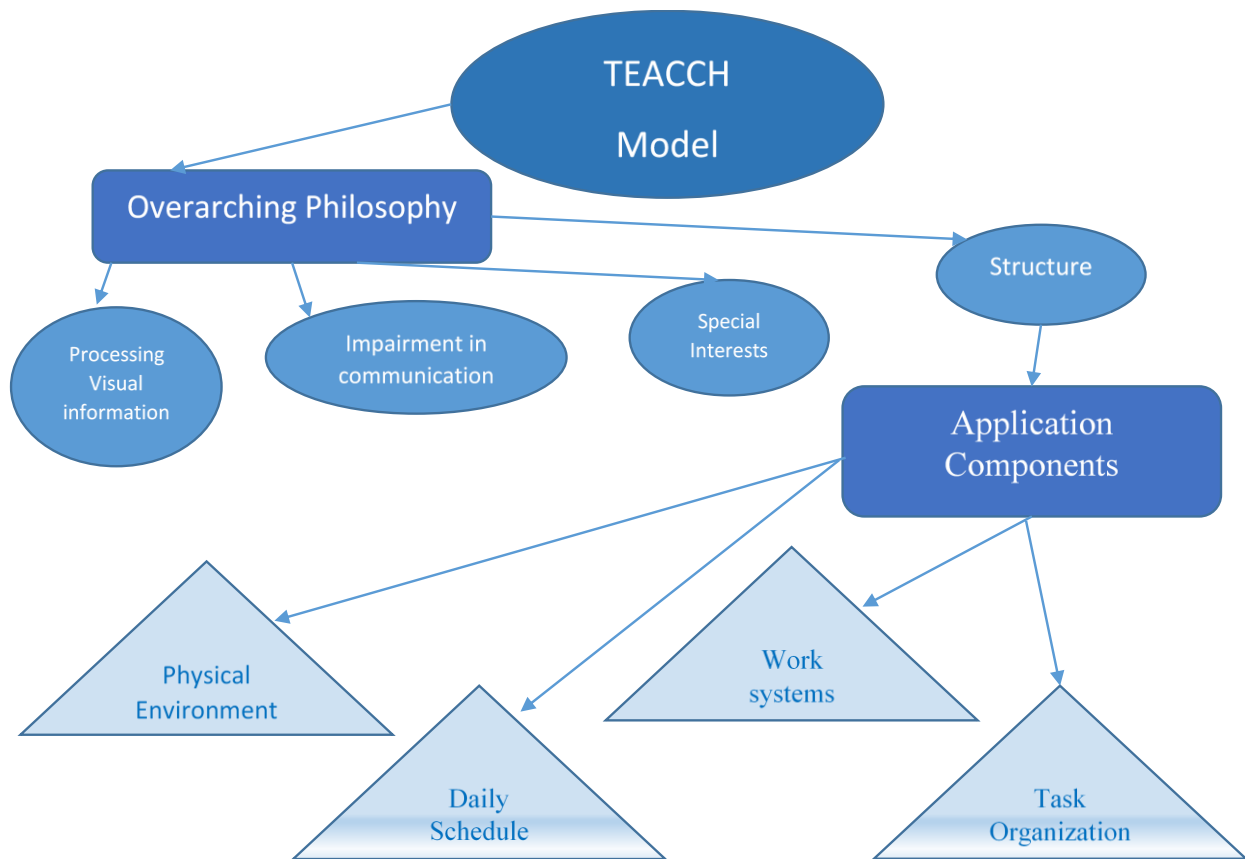


Figure 1: The Conceptual Model

Discussion

Physical Structure

Definition and purpose. Physical structure of the environment is the first component of Structured Teaching under the TEACCH model as defined by Schopler et al., (1995). Mesibov, Shea, and Schopler (2004) define physical structure as an organization of all settings that are clear, manageable, and interesting for students with autism but with a certain amount of individuality for each student. For children with autism, the physical layout of the environment is crucial in helping them become more successful. Organization of items such as furniture can help to decrease anxiety, reduce overstimulation, limit distractions, and encourage independence (Mesibov et al., 2004). When setting up the environment it

is important to consider items like lighting, noise, and barriers that may cause the child to experience anxiety, overstimulation, or distractions. Mesibov, Shea, and Schopler (2004) also promote the labeling of certain items in the classroom such as the computer, desk, independent work stations, bathrooms, play areas, and where to sit at lunch. Scheuermann and Webber (2002) recommend that one-on-one instruction and independent work areas be located in parts of the room that are visually secluded from the rest of the room; especially when working with students who are easily distracted. Furthermore, Ganz (2007) recommended the student's work areas be near required materials so materials are easily accessible.

Age of the students should play a role in how the environment is set up. Younger children need an environment that has play and snack areas, spaces for individual work, as well as, an area to develop their self-help skills (Mesibov et al., 2004). Older students need an environment that encourages social interaction with peers, individual and whole group instruction, areas to develop vocational skills, and places where they can pursue their specific interests (Mesibov et al., 2004).

Establishing an evidence base. Presently, physical structure is not included in the NAC (2009) report as either an established practice or an emerging practice. However, physical structure is included in several research articles that discuss schedules, which are considered an evidence-based practice according to the NAC (2009) report. Of the 19 articles that met the final review criteria, none of the articles discussed physical structure as the sole intervention. Seven of the 19 articles mentioned physical structure as an important component when implementing an effective work system or schedule (Bennett, et al., 2011; Carnahan, et al., 2011; Ganz, 2007; Hume & Odom, 2007; Kurt & Parsons, 2009; Mesibov & Shea, 2010; Van Bourgondien & Schopler, 1996).

Conclusion of evidence base. Based on the review of research on physical structure of the environment, this component may be an area in need of further research. All children with autism differ in how they respond to their physical environment; therefore it is difficult to identify physical structures in isolation from other components that will meet the needs of all children with autism. However, it is believed that physical structure is a critical element when implementing Structured Teaching under the TEACCH model and

should be considered, critically and intently, when designing the physical environment of a classroom.

Daily Schedule

Definition and purpose. The second element of Structured Teaching under the TEACCH model is daily schedule. Mesibov et al., (2004) define daily schedule as a visual means to communicate the sequence of an upcoming task or event. A daily schedule allows students with autism to become less dependent on adult cues and prompts. Schedules tell students: which activities can be anticipated, when the activities will occur, and the order of the activities (Ganz, 2007; Schopler et al., 1995). Schedules also assist students in adjusting to unusual activities or changes in normally occurring events (Schopler et al., 1995).

Bryan and Gast (2000) implemented a schedule with four elementary-age children with autism and found that a daily schedule increased engagement and decreased disruptive behaviors. MacDuff, Krantz, and McClannahan (1993) trained parents to use visual schedules in their home with three boys of elementary school age. The results revealed an increased in socially initiated behavior as well as on task behavior. MacDuff, Krantz, and McClannahan (1993) implemented photographic schedules with four boys with autism between the ages of nine and 14 and found that schedules increased the amount of time the boys engaged in on task behavior. Dettmer, Simpson, Myles, and Ganz (2000) found using schedules decreased the number of prompts needed for two young boys in elementary school.

Establishing an evidence base. According to the NAC (2009) report schedules are the only component of Structured Teaching under the TEACCH model that is evidence-based. The NAC report defines schedules as “an ability to communicate a series of

activities or steps required to complete a specific activity” (NAC, 2009, p.49). According to the NAC (2009), to be considered an evidence-based practice, the treatment must have several well-controlled studies that clearly show the effectiveness of the intervention. The NAC report (2009) provides a list of 12 studies that support the use of schedules as an effective intervention for children with autism (Arntzen et al., 1998; Bryand & Gast, 2000; Dettmer et al., 2000; Dooley et al., 2001; Hall et al., 1995; Hume & Odom, 2007; Krantz et al., 1993; MacDuff et al., 1993; Massey & Wheeler, 2000; Morrison et al., 2002; O’Reilly et al., 2005; Schmit et al., 2000).

Conclusion of evidence base. Since schedules have been determined by the NAC (2009) to be an evidenced based practice, the current article did not evaluate the practice based on the Reichow et al. (2007) criteria. Future research is needed to determine if the articles cited by the NAC report (2009) do meet Reichow et al. (2007) criteria.

Independent Work Systems

Definition and purpose. Work systems are the third component of Structured Teaching under the TEACCH model as defined by Schopler et al. (1995). TEACCH defines work systems as being able to visually answer four critical questions (TEACCH, Autism Project, 2009). The questions are: a) what is the work to be done? b) how much work is to be done? c) when is the work finished? and d) what comes next? (TEACCH, 2009). Hume and Reynolds (2010) points out how a work system is different from a visual schedule. They see the primary difference between work systems and visual schedules being one of purpose. The purpose of a visual schedule is to “indicate location and instruct a student where to go....; work systems try to

provide students ...a meaningful and organized strategy to help them start and complete a number of tasks or activities” (Hume & Reynolds, 2000, p.229). This distinction is necessary for understanding implementation and in understanding if individual components of Structured Teaching meet criteria as evidence-based practices.

The dependent variables that are typically targeted for increase with work systems are: *on task behaviors, work completion, and independence* (Bennett, Reichow, Wolery, 2011; Hume & Odom, 2007). The dependent variables that are typically targeted for decrease are: *stereotypic behaviors and adult prompting or correction* (Bennett et al., 2011). Bennett, Reichow, and Wolery (2011) found an increase of *on task time* and *work completion* with three participants using play skills in a multiple baseline design. Using an ABAB design with two elementary age males with autism as participants, they concluded that the use of structured work systems resulted in *greater engagement* and *more task completion*, as well as, reduced escape motivated behaviors and lower levels of self-stimulatory behaviors. Hume and Odom (2007) found increases in *independent task completion* and *on task behavior* through the use of work systems across three participants. Two of the participants were in a preschool setting with play skills as the tasks, and one participant in an employment setting with job tasks (Hume & Odom, 2007). In a follow-up study cited by Hume and Reynolds (2010), Hume and Odom (2009) concluded that students increased *on task time* and *independent task completion* along with a decrease in the need for adult support. Similarly Panerai, Ferrante, and Zingale (2002) used a comparison design in the areas of imitation, perception, gross-

motor and eye-hand coordination suggesting that the use of work systems may enhance more skills than just on task behavior and independence. Further empirical research is needed as the article by Panerai et al., (1998) does not meet the Reichow et al. (2007) criteria as discussed below.

Establishing an evidence base. Of the four critical components, identified by Schopler et al., (1995) as necessary for implementation of the Structured Teaching under the TEACCH model, only the use of schedules is listed as an “established” practice, as noted previously, in the NAC report (2009). Schedules, as defined by the NAC report, include use of task lists that “communicate a series of activities or steps required to complete a specific activity” (NAC, 2009, p. 49). Further research will be necessary to determine if the definition of work systems meets the criteria of being a task list. Furthermore, researchers should determine if the definitions of task list and work system are interchangeable. Discerning if there is a difference between having a system that answers the following: a) what is the work to be done? b) how much work is to be done? c) when is the work finished?, and d) what comes next? ; compared to having a system that tells what steps to do needs further research. If researchers find there is no difference, it may be reasonable to question why independent work systems would not be included as an “established” practice since task lists are currently considered established practices.

Further complicating establishing an evidence-base for work systems comes from the work conducted by the National Professional Development Center on Autism Spectrum Disorders (NPDC on ASD, 2008) which set standards for evidence based practices. Using the criteria

described below, work systems is listed as an evidenced based practice on the NPDC list (2008). The definition is based on efficacy being established through peer-reviewed research using at least two high quality experimental or quasi-experimental design studies, and at least five high quality single subject design studies by at least three different investigators or groups (NPDC on ASD, 2008). High quality for experimental or quasi-experimental is defined as not possessing any critical flaws that confound the studies. High quality for single subject design also includes having no critical flaws, as well as, demonstrating at least three evidences of experimental control (NPDC on ASD, 2008).

The NPDC on ASD identify four studies to support the decision of structured work systems as an evidenced-based practice. Of the four studies identified by NPDC on ASD, three met criteria for inclusion in this author’s current meta-analysis (Dettmer, Simpson, Myles, & Ganz, 2000; Hume & Odom, 2007; Panerai, Ferrante, & Zingale, 2002). The fourth article identified by the NPDC on ASD, Panerai, Ferrante, and Caputo (1997), was included in the inclusion criteria even though the study included participants that were diagnosed with profound intellectual disabilities as well as students with autism. Additionally, the Dettmer et al. (2000) article did not meet the inclusion criteria because it did not specifically discuss Structured Teaching under the TEACCH model in the content.

Of the 19 studies identified for the current review of Structured Teaching under the TEACCH model, only three studies used structured work systems in isolation (Bennett et al., 2011; Hume & Odom, 2007; Panerai et al., 2002). Four of the nineteen articles included discussion on work systems along with other critical

components of Structured Teaching under the TEACCH model (Howley, Preece, & Arnold, 2001; Panerai, Ferrante, Cuputo, & Impellizzeri, 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010). Four of the articles were not research based but were either literature reviews or summaries of the benefits of work systems (Ganz, 2007; Ryan, Hughes, Katsiyannis, McDaniel, & Sprinkle, 2011; Swanson, 2005; Tutt, Stuart, & Thornton, 2006).

The total number of participants for Bennett et al. (2011), Hume and Odom (2007), Panerai et al. (2002) were respectively three preschool age students, eighteen elementary age students, and one young adult in an employment setting; all with a diagnosis of autism based on standard measures using either the Childhood Rating Scale (CARS) or the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV) or a combination of both depending on the study reviewed. Gender breakdown, for the three studies mentioned above, were one female participant who was preschool age, two male participants of preschool age, 18 male participants of elementary age, and one male participant; age 20 (Bennett et al., 2011; Hume & Odom, 2007; Panerai et al., 2002).

The total number of participants investigated by the author that included discussion on work systems along with other critical components of Structured Teaching under the TEACCH model totaled two elementary age students and thirty three adolescents or young adults (Bennett et al., 2011; Howley, Preece, & Arnold, 2001; Hume & Odom, 2007; Panerai et al. 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010). All but three of the participants were students with a diagnosis of autism using the Childhood Rating Scale (CARS); meeting the criteria of the DSM-IV

or an undisclosed method of diagnosis depending on the study reviewed. The three participants without a diagnosis of autism were diagnosed with multiple disabilities and visual impairments (Taylor & Preece, 2010). Gender and age breakdown for these four studies included one female participant of elementary age, five female participants ranging in age from 16-30, one male participant of elementary age, and twenty-eight male participants ranging in age from 13-30 (Howley, Preece, & Arnold, 2001; Panerai et al., 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010).

Conclusion of evidence base. Using the Reichow et al. (2007) criteria, only two of the three identified studies received an adequate rating. Both Bennett et al. (2011) and Hume and Odom (2007) met criteria for six of the primary indicators. Hume and Odom (2007) also showed evidence of three of the secondary indicators. Bennett et al. (2011) showed evidence of only two of the secondary indicators. Panerai et al. (2002) met criteria for only three of the primary indicators and one secondary indicator. Limited discussion of the Structured Teaching components in an operational manner, confusion in understanding of the difference between Structured Teaching and TEACCH model or philosophy were weaknesses noted in the Panerai et al. (2002) study. Panerai et al. (2002) states that the TEACCH model has three fundamental principles; "an individual educational program, environmental adaptation, and alternative communication training." Not clearly understanding the components of Structured Teaching under the TEACCH model versus the TEACCH approach or philosophy behind the model led to the description flaws in Panerai et al. (2008) and thus the low ratings described above, based on the authors conclusions.

Of the four additional studies reviewed that researched other systems along with visual task organization systems, all four were rated as weak. Siaperas et al. (2006) showed evidence of two of the primary indicators and two secondary indicators, while Howley et al. (2001) and Taylor et al. (2010) only met criteria for one primary indicator and zero secondary indicators.

Based on this analysis using the Reichow et al. (2007) criteria the conclusion would be that work systems lack the evidence-base to be considered an effective or promising practice. Yet, it has been listed with a national group as being evidence-based. Further research will need to be conducted with fidelity in order to meet the criteria of Reichow et al. (2007) in order for work systems be proven as a globally evidenced-based practice.

Visual Task Organization

Definition and purpose. The fourth and final component of Structured Teaching under the TEACCH model, as defined by Schopler et al., (1995) is task organization. Similarities exist between the definition of a work system and the definition of visual task organization. Both components are designed to address the dependent variables of: *increasing on task behavior, work completion and independence* (Bennett et al., 2011; Hume & Odom, 2007; Mavropoulou, Papadopoulou, & Kakna, 2011). The dependent variables that are typically targeted for both components also show similarity, those being *reduction of distraction and adult prompting or correction* (Bennett et al., 2011; Mavropoulou et al., 2011).

The differences between the two components, based on the TEACCH autism program, (2012) is that task organization is related to how a teacher approaches the individual learning of skills and tasks while

work systems are individualized for students and assist in understanding order of individual events or activities. TEACCH (1996) further defines visual task organization as possessing three elements for implementation (a) instructions, (b) organization, and (c) clarity as cited in Ganz (2007). The instructional element can take a variety of forms. Mavropoulou, Papadopoulou, and Kakna, (2011) provided a variety of methods for visual instructions from actual materials defining the task, product samples, written labels and actual photographs of the steps to be completed. The rationale for visual instructions is that it makes learning more predictable which helps limit distractibility and lack of motivation (TEACCH Autism Program, 2012). Organization and clarity of tasks are achieved by simplifying the task parts, and highlighting the important details of the task (Ganz, 2007). Tasks should have only the necessary materials required for task completion and may need to have the individual parts of the task separated into containers or sections (Ganz, 2007). Mavropoulou et al. (2011) used visual task organization with two elementary aged males, both with a diagnosis of autism, to investigate *on task, task completion, and task accuracy* using play materials. The findings of Mavropoulou et al. (2011) which are based on the visual analysis and calculating of Percent of Non-overlapping data (PND) of the ABAB design, concluded that on task behavior for both participants did change based during intervention, but for only one of the participants did the PND show that visual structure was effective (Mavropoulou et al., 2011). Increases in on task behavior along with a reduction in behavioral difficulties and increased communication were found by Panerai, Ferrante, Cuputo and Impellizzeri (1998) using all four components of Structured

Teaching under the TEACCH model with adolescents with autism.

Establishing an evidence base. A similar discussion, which is noted in the previous work systems section of this review, can be made for visual task organization. Currently, visual task organization is not included in the NAC (2009) report as either an established practice or as an emerging practice. However, as with work systems, there appears to be some practices that include the concept, if not the definition, of task organization as a part of the already determined evidence-based practice. Not only is the discussion similar to work systems for the practice of schedules as explained earlier, but also the practice of antecedent packages brings some questions of similarity for visual task organization. In the description of antecedent packages, the NAC (2009) report states “examples include but are not restricted to environmental modification of task demands” (NAC, 2009, p.44). As with work systems, task organization appears to have many questions in need of further research. As researchers continue to design studies incorporating the use of visual systems, clearly defining the terms may be useful in determining if visual organization meets criteria as an evidenced based practice.

Of the 19 studies identified for the current review of Structured Teaching under the TEACCH model, only one exclusively used visual task organization as an intervention (Mavropoulou et al., 2011). Only 4 of the 19 articles included discussion on visual task organization along with other critical components of Structured Teaching under the TEACCH model (Howley, Preece, & Arnold, 2001; Panerai, Ferrante, Cuputo, & Impellizzeri, 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010). Four of the articles identified were not research based but summary articles describing the

components of visual task organization (Ganz, 2007; Ryan, Hughes, Katsiyannis, McDaniel & Sprinkle, 2011; Swanson, 2005; Tutt, Stuart, & Thornton, 2006).

Mavropoulou et al. (2011) investigated visual task organization with two male participants. Both participants held a diagnosis of autism based on standard measures using the criteria of the DSM-IV. The total number of participants in the research involving visual task organization totaled two elementary age students, 33 adolescents or young adults (Bennett et al. 2011; Howley, Preece, & Arnold, 2001; Hume & Odom, 2007; Panerai et al 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010). All but three of the participants were students with a diagnosis of autism using the Childhood Rating Scale (CARS) or they met the criteria of the DSM-IV or an undisclosed method of diagnosis depending on the study reviewed. The three participants were diagnosed with multiple disabilities and visual impairments (Taylor & Preece, 2010). Gender and age breakdown for these four studies included one female participant of elementary age, five female participants ranging in age from 16-30, one male participant of elementary age, and 28 male participants ranging in age from 13-30 (Howley, Preece, & Arnold, 2001; Panerai et al 1998; Siaperas & Beadle-Brown, 2006; Taylor & Preece, 2010).

Conclusion of evidence base. Using the Reichow et al., (2007) criteria, Mavropoulou et al., (2011) received an adequate rating based upon showing evidence of five of the primary indicators and three of the secondary indicators. The only primary indicator that was not met on the preliminary review for Mavropoulou et al. (2011) was the use of a comparison condition. The secondary indicators not present were use of random assignment,

blind raters, fidelity, attrition, and effect size.

The four additional studies that covered both work systems and visual task organization, along with other components, were summarized in the work system section of this review. All studies were found to have weak ratings using the Reichow et al., (2007) criteria.

Based on this analysis, using the Reichow et al., (2007) criteria, a slight case could be made that visual task organization shows evidence of being a promising practice. However, this is based on just one research study. Clearly, there is need to design rigorous investigations using visual task organization as the only independent variable in order to add to the currently limited research on this topic.

Recommendations for Future Research

An area for future research would be to further separate the components of Structured Teaching versus the TEACCH approach or philosophy to further alleviate confusion in discerning what is meant when researchers and/or practitioners talk about implementing the TEACCH model. Callahan, Shukla-Mehta, Magee and Wie (2010) address this confusion in the analysis of data points, summarized in the *ABA versus TEACCH: The Case for Defining and Validating Comprehensive Treatment Models in Autism* (2010). Callahan et al. (2010) identified experts in the TEACCH model, as "individuals who had completed national training in the models and who were familiar with the use of the model within the field of autism intervention" (2010, p. 76). While the purpose of Callahan et al. (2010) is to investigate the components of each model separately and collectively on the basis of social validity factors, the authors do discuss that one of the data points, specifically survey question six, "*use of students' preferences and/or*

obsessive interests as reinforcers..." was rated by seven of the eight TEACCH experts as being a part of the TEACCH approach, but not a component of the TEACCH model (Callahan et al. 2010, p.82). Further research and/or development of other conceptual models similar to the one contained in this meta-analysis may prove useful in determining what components of the comprehensive package make up the TEACCH model and/or what combinations of those components are evidenced based practices.

An additional recommendation would be for the field to discern if there is a need for alternative or companion standards for evaluating what evidence-based criteria there should be across all groups or organizations. This would be helpful for practitioners looking for guidance on evidenced-based practices. If research is to guide practice, the field must be able to collaboratively assist in identifying a sound approach to determine evidence-based criteria.

In addition to the one standard for evaluating what evidence-based criteria should be, further work on operationally defining practices needs to be explored so clarity exists for researchers and practitioners alike. As discussed in visual task organization, some of the previously established evidenced-based practices from the NAC (2009) report have definitions that are not necessarily operationally defined. Without more clarity in definitions, it is difficult to discern what is meant by some of the interventions and why some of the individual components of the Structured Teaching under the TEACCH model do not already meet the criteria as evidenced based interventions. Researchers should continue to question and investigate the standards for establishing a practice as evidenced-based until there is agreement

across disciplines of what constitutes effective evidence-based practices for persons with an autism spectrum disorder.

Conclusion

Based on this synthesis, it is evident that further work is needed in the field of autism to clarify what is meant when researchers and practitioners discuss TEACCH model implementation. Based on the review of the existing research for the individual Structured Teaching components under the TEACCH model, there continues to be a need for more work to have all components meet criteria as evidenced-based practices with the exception of

schedules based on Reichow et al. criteria (2007). Further research is necessary to understand and act on the phenomena that exist with the high use and acceptance of the implementation of the TEACCH model by practitioners and the lack of acceptance it has as an effective practice by researchers in the field. Bridging this gap must occur in order for professionals in each group to continue finding value and worth in one another. While differences of opinion exist in the field, it is incumbent upon professionals to seek avenues of commonality in order to best meet the unique and individual needs of persons with an autism spectrum disorder.

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*References marked with an asterisk indicate studies included in the literature synthesis

Appendix

Table 1 – Research on Work systems analyzed with Reichow et al. (2008) criteria

Authors	# of Primary QI	# of Secondary QI	Strength Rating	Established as EBP or Promising practice?
Bennett, Reichow, & Wolery (2011)	6	2	Adequate	yes
Hume & Odom (2007)	6	3	Adequate	yes
Panerai, Ferrante, & Zingale (2002)	3	1	Weak	no

Table 2 – Research on Visual Task Organization analyzed with Reichow et al. (2008) criteria

Authors	# of Primary QI	# of Secondary QI	Strength Rating	Established as EBP or Promising practice?
Mavropoulou et al. (2011)	5	3	Adequate	yes

Table 3 – Research on Work Systems, Visual Task Organization and other components analyzed with Reichow et al. (2008) criteria

Authors	# of Primary QI	# of Secondary QI	Strength Rating	Established as EBP or Promising practice??
Howley, Preece & Arnold (2001)	1	0	Weak	no
Panerai, Ferrante, Cuputo, & Impellizzeri (1998)	3	0	Weak	no
Siaperas & Beadle-Brown (2006)	2	2	Weak	no
Taylor & Preece (2002)	1	0	Weak	no