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Abstract

The Sensory Form is a new assessment and intervention planning tool utilized with occupational therapy students to teach and guide their professional reasoning amidst limited evidence. This study aimed to determine the impact of the use of The Sensory Form on student competence and confidence in assessment and intervention planning for children with atypical sensory processing (ASP). A quasi-experimental study was conducted with 84 third-year undergraduate occupational therapy students from a large multi-campus university in New South Wales, Australia. Tutorial classes were allocated to The Sensory Form or usual teaching conditions. Participants completed pre-class and post-class self-reported confidence rating scales and case study activity to assess their competence as rated by an occupational therapy academic using a set rubric who was blinded to group allocation. Data were analyzed using descriptive statistics as well as univariate ANOVA (self-rated confidence) and independent samples t-tests (case study activity) to determine statistical differences between groups. All participants significantly increased in confidence from pre-class to post-class ($p < 0.001$), however, The Sensory Form group did not increase significantly more than the standard teaching group. The Sensory Form group demonstrated significantly higher competence in sensory processing assessment ($p < 0.001$). No differences between groups were observed in intervention planning. The Sensory Form has the potential to develop students' competence in conducting assessments for children with ASP. Future research is needed to determine how The Sensory Form can effectively support students' overall confidence, and competence in intervention planning.

Keywords

Sensory processing, professional reasoning, occupational therapy education, children's occupational therapy

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ABSTRACT

The Sensory Form is a new assessment and intervention planning tool utilized with occupational therapy students to teach and guide their professional reasoning amidst limited evidence. This study aimed to determine the impact of the use of The Sensory Form on student competence and confidence in assessment and intervention planning for children with atypical sensory processing (ASP). A quasi-experimental study was conducted with 84 third-year undergraduate occupational therapy students from a large multi-campus university in New South Wales, Australia. Tutorial classes were allocated to The Sensory Form or usual teaching conditions. Participants completed pre-class and post-class self-reported confidence rating scales and case study activity to assess their competence as rated by an occupational therapy academic using a set rubric who was blinded to group allocation. Data were analyzed using descriptive statistics as well as univariate ANOVA (self-rated confidence) and independent samples t-tests (case study activity) to determine statistical differences between groups. All participants significantly increased in confidence from pre-class to post-class ($p < 0.001$), however, The Sensory Form group did not increase significantly more than the standard teaching group. The Sensory Form group demonstrated significantly higher competence in sensory processing assessment ($p < 0.001$). No differences between groups were observed in intervention planning. The Sensory Form has the potential to develop students' competence in conducting assessments for children with ASP. Future research is needed to determine how The Sensory Form can effectively support students' overall confidence, and competence in intervention planning.

Occupational therapists are health professionals who work with a wide range of populations seeking to "promote health and well-being through occupation" (World Federation of Occupational Therapists, 2020). In Australia, qualification and registration as an occupational therapist requires a minimum of four years of undergraduate tertiary study, or two years post graduate study in an approved program (Occupational Therapy Board of Australia, 2018a). Upon graduation, occupational therapists must demonstrate competence and confidence in making practice decisions based on sound professional reasoning. This is particularly important in practice areas with limited research evidence (Occupational Therapy Australia, 2010). Competence is defined as the successful use of knowledge, skills and judgement in alignment with evidence-based practice standards (Occupational Therapy Board of Australia, 2018b), while confidence is a student's perception about their capacity to meet academic demands and may be linked to success in the classroom (Bickerstaff et al., 2017).

To date, there has been little focus on teaching occupational therapy students to use formalized professional reasoning processes and there are few tools available to educators to teach and/or evaluate occupational therapy students' professional reasoning skills (Gee et al., 2017). This paper specifically considers professional reasoning in relation to supporting atypical sensory processing (ASP) in children, a common practice area in occupational therapy for children (Pfeiffer et al., 2018).

Literature Review

ASP occurs when there is a mismatch between a person's ability to process and integrate sensory input (sound, visual input, touch, taste/smell, and movement), and the demands of their environment (Ashburner et al., 2014; Pfeiffer, May-Benson et al., 2018). ASP occurs in children independently, co-morbidly and as a symptom of various developmental conditions (Pfeiffer et al., 2018) including Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder. It affects 10-55% of children without a diagnosed condition, and 40% to 88% of children with a diagnosed condition with a large variability observed depending on the person's diagnosis, age and severity (Pfeiffer, Clark et al., 2018). ASP is a key area of concern for occupational therapists because of its impact on important occupations for children across both home and school contexts (Ismael et al., 2018; Schaaf et al., 2015), including feeding (Zobel-Lachiusa et al., 2015); grooming, dressing, toileting (Armstrong et al., 2013); academic achievement (Koenig & Rudney, 2010); and play and social participation (Thye et al., 2018).

Conceptual frameworks may be used to inform professional reasoning in practice and Dunn's (2014) sensory processing framework is used to guide understanding of ASP in children. The framework describes four patterns of sensory processing (seeker, avoider, sensor, bystander) which are the result of interactions between a child's neurological thresholds and their self-regulation strategies (Brown & Dunn, 2010).

Research evidence also plays a significant role in informing professional reasoning in practice. Despite the plethora of sensory processing literature, there is a lack of consensus about definitions and effectiveness of sensory processing interventions (Pfeiffer, May-Benson et al., 2018), including Sensory Integration Therapy, sensory-based interventions and sensory specific techniques (Parham et al., 2007; Schoen et

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al., 2019). This may be due to issues with poor intervention fidelity (Parham et al., 2007; Schoen et al., 2019) and weaknesses in study designs (Schoen et al., 2019). Similarly, the evidence for other sensory interventions including environmental modifications, sensory activities and teaching self-regulation strategies, remains preliminary (Ashburner et al., 2014; Dean et al., 2019). The limited, heterogeneous and low-quality evidence for sensory processing interventions has consequently resulted in a lack of guidance for therapists' professional reasoning in selecting and planning interventions for children with ASP (Mills et al., 2020).

There are limited reports within the literature regarding the professional reasoning processes used by therapists in their selection of interventions for children with ASP (Gee et al., 2017). Only one study by Ashburner et al. (2014) was found that provided guidance for professional reasoning for intervention selection for children with ASP. Furthermore, there is a limited conclusive evidence base from which to educate students on appropriate interventions for children with ASP. In the absence of clear research evidence to guide practice, there is a crucial need for a professional reasoning process to support students to navigate the existing evidence and provide them with appropriate guidance to make confident and competent practice decisions.

Teaching approaches utilized by occupational therapy educators may also have an impact on the development of confidence and competence in using professional reasoning skills. Worked examples combined with tutored problem-solving strategies are shown to be effective teaching methods for novice students because they have reduced cognitive load compared with unsupported problem-based learning (Schwonke et al., 2009; Van Gog & Rummel, 2010). They also provide didactical step-by-step principles that develop a cognitive schema that students can apply or adapt to future problems (Van Gog & Rummel, 2010), and prompt students to self-explain their decisions to prevent their pursuit of unproductive strategies (Schwonke et al., 2009). The teaching approaches utilized may have an impact on the development of professional reasoning and on a student's capacity to apply reasoning skills to a real life scenario (Gee et al., 2017).

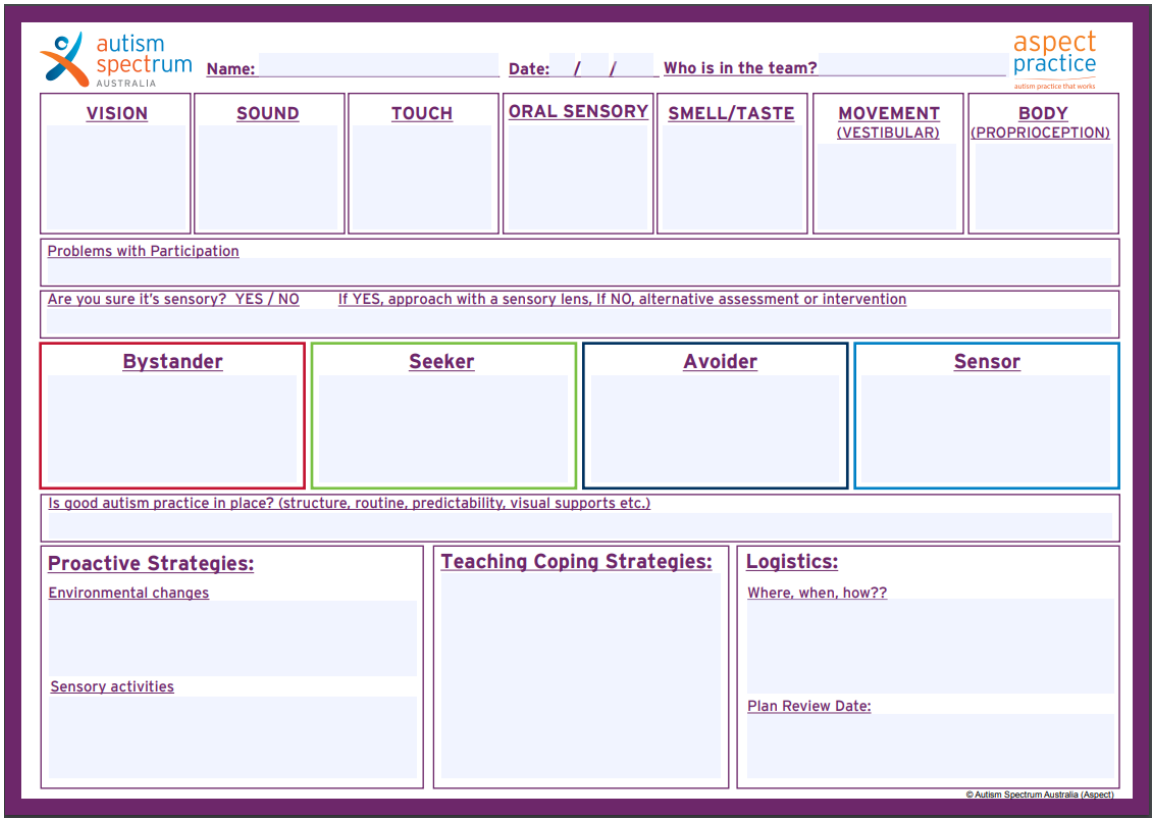
Limited research exists on how occupational therapy students learn professional reasoning skills and apply them to clinical problems throughout their coursework (Gee et al., 2017). There are also few objective or formative tools available to assess and/or teach students professional reasoning skills (Gee et al., 2017), and no research was located that evaluated the impact of a structured reasoning approach on therapists' intervention planning.

The Sensory Form is a tool produced by a large not-for-profit organization in Australia in 2017, who have made the tool freely available for use (Autism Spectrum Australia, 2018; Mills, Michail, et al., 2020). It is an assessment and intervention planning tool that is designed to provide a structured professional reasoning framework to ensure the selection and planning of the most evidence-based and occupation-based interventions for children with ASP. This study is the first to evaluate the use of The Sensory Form (Autism Spectrum Australia, 2018; Mills, Michail, et al., 2020; see Figure 1) as a professional reasoning framework for university students.

The Sensory Form can streamline the way assessment results inform intervention selection by addressing the child's ASP, with a focus on participation. The tool utilizes Dunn's Sensory Processing Framework (Dunn, 2014) and focuses on sensory strategies to support participation in everyday activities through assessment and intervention. The Sensory Form has the potential to develop occupational therapy students' professional reasoning skills throughout the assessment and intervention planning processes for children with ASP and empirical investigation is warranted. The aim of this study was to evaluate the impact of The Sensory Form on the confidence and competence of third-year undergraduate occupational therapy students in completing assessments and intervention planning for children with ASP.

Figure 1

The Sensory Form



Materials and Methods

Study Design

A quasi-experimental research design comparing two groups was employed to determine the impact of The Sensory Form on the confidence and competence of undergraduate occupational therapy students in conducting individual sensory assessments and making decisions about sensory processing interventions for children with ASP. Quasi-experimental designs can be used to evaluate causal impact and compare outcomes between two groups (Rockers et al., 2017).

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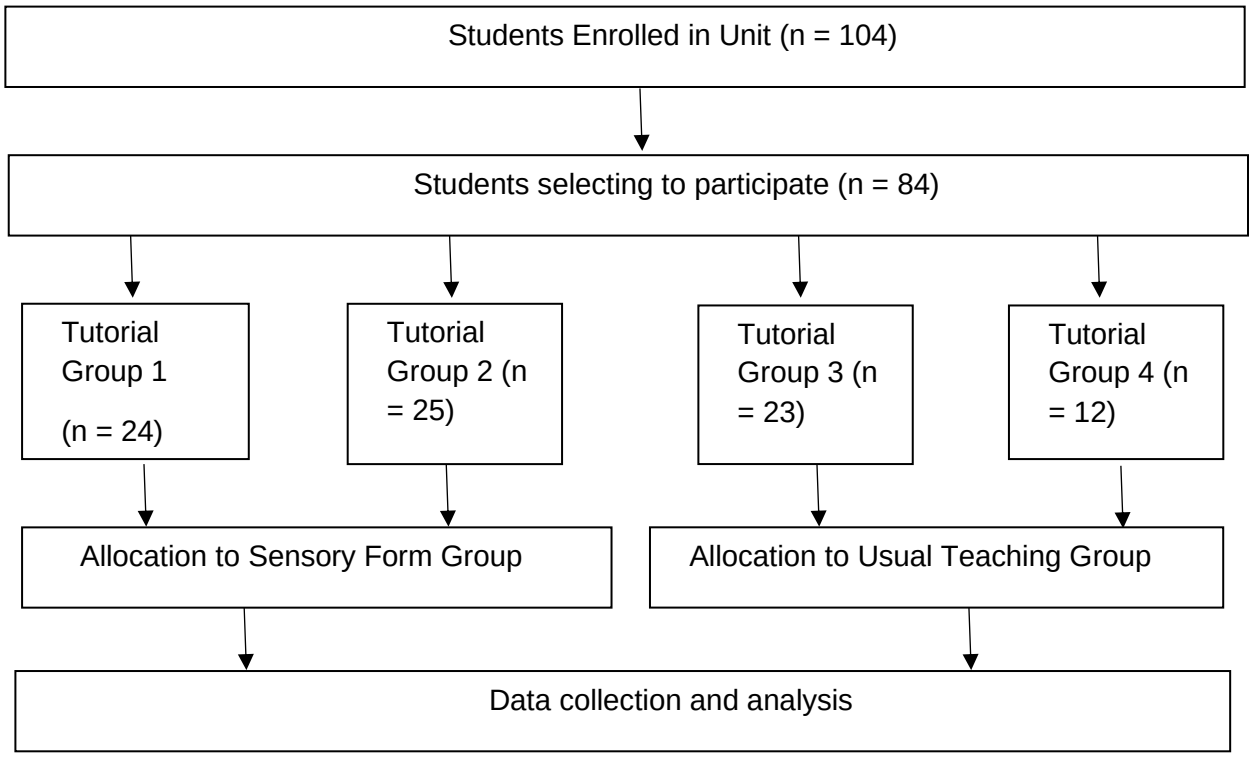
Participants

This study was approved by Western Sydney University's Human Research Ethics Committee (Approval No: H12874). Students were recruited from the third-year undergraduate occupational therapy compulsory unit in occupational therapy for children at a large university in New South Wales, Australia. Students were eligible to participate if they were enrolled in the unit at the time of the study and attended their tutorial class on the day of data collection. Participation in the study was voluntary and students gave written informed consent for their participation. Some students indicated they had previous personal, employment, volunteer work, or fieldwork experience in sensory processing practice, however, no students had clinical experience as an occupational therapist nor had been exposed to The Sensory Form prior to the study. Prior to enrollment in the unit, students had completed a total of five undergraduate units in anatomy and physiology, including a unit specifically focusing on neuroanatomy. Students, however, had not previously completed any units of study where they were introduced to sensory processing theory or Dunn's sensory processing framework. This study compared two groups, The Sensory Form teaching group (n= 49) and a usual teaching group (n= 35), which were allocated based on tutorial group enrollment. Figure 2 shows the participant recruitment process and the distribution of the sample size.

Figure 2

Participant Flow Diagram Showing Student Enrolment and Group Allocation



Research Procedure

At the beginning of the semester, students were allocated into four tutorial groups through the university's computerized tutorial allocation process. No researchers were involved in this process. Each of the four tutorial groups were randomly allocated to The Sensory Form condition or the standard teaching condition by drawing group names out of a hat, with two groups allocated to each condition.

Prior to the study, a researcher who was not involved in data analysis used an online random number generator to generate unique identifier codes for each student. On the day of data collection, each participating student chose a unique code out of a hat at random and used this instead of their name on all data collection forms to ensure assessor blinding to student identity and group allocation during data analysis. Assessments for the unit were not based on sensory processing content to guarantee that a student's group allocation in the study and access to teaching materials would not influence their final semester grade.

Students in The Sensory Form group received teaching content on sensory processing assessment and intervention which included The Sensory Form and practical activities based on The Sensory Form. Students in the usual teaching group received standard teaching using sensory processing material on assessment and intervention that would usually be taught in the unit and did not include The Sensory Form. In order to prevent contamination between the two sets of teaching content, students had access to paper based learning materials in class only and no online access during or prior to the tutorial. For ethical reasons, all learning materials were made available online to all students following data collection. Time was allocated in the class following the study to discuss and clarify any content. In addition, sensory processing assessment and intervention did not form part of the assessment for the unit to avoid disadvantage to either group.

The teaching approach used by the occupational therapy educator in both conditions was a combination of theory, worked examples and problem-solving in the form of case studies (Schwonke et al., 2009; Van Gog & Rummel, 2010). All teaching was delivered face-to-face on the university campus by the same occupational therapy educator who was not a researcher in this study. Tutorial classes were two hours in length, and all data collection was completed within the tutorial classes. Students had the opportunity to attend a one-hour face to face theory lecture on sensory processing delivered by the unit coordinator, or listen to the recorded lecture, before their tutorial participation.

The Tool: The Sensory Form

The Sensory Form is comprised of eight sections that systematically address assessment and intervention planning for children with ASP (Mills, Michail, et al., 2020; see Figure 1). Section one prompts the student to identify sensory behaviors the child displays across each of the sensory systems (vision, sound, touch, oral sensory, smell/taste, movement/vestibular and body/proprioception), while section two prompts the student to consider whether the child's sensory behaviors are impacting their participation in daily occupations. Section three then asks the student to consider whether the presenting problems are actually sensory in nature by considering the function of the observed behavior (Murray-Slutsky & Paris, 2005). This supports an occupation-based approach and avoids over-attributing daily

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challenges to the child's sensory differences, as behaviors can often be the result of a complex combination of cognitive, emotional, social, and sensory issues (Ashburner et al., 2014). Section four comprises four boxes from Dunn's Sensory Processing Framework (Seeker, Avoider, Sensor, Bystander; Dunn, 2014), and prompts the student to consider the child's individual processing pattern/s.

In section five, students are prompted to consider the implementation of "good autism practice". These are evidence-based, non-sensory supports that can impact the child's sensory processing capacity and participation (Mills, Michail, et al., 2020), such as autism-friendly environments (Autism Spectrum Australia, 2018), visual supports (Knight et al., 2015) and augmentative and alternative communication (Sigafoos et al., 2014). This section was included because the developers of The Sensory Form had a particular focus on supporting individuals on the autism spectrum (Autism Spectrum Australia, 2018).

The three intervention components of the form are designed to guide intervention planning to support the child's participation in context, rather than remediating sensory processing differences (Mills, Michail, et al., 2020).

Section six presents two proactive strategies, environmental changes and sensory activities, intended to prevent sensory problems from occurring. Environmental modification includes the physical room layout, sound, lighting, and the presence of distractions (Kinnealey et al., 2012). Sensory activities can be used to support task engagement (Mills, Chapparo, et al., 2020) and may include movement breaks, deep pressure, heavy work activities and fidget toys (Mills, Chapparo, et al., 2020). In section seven, consideration is given to strategies that can be taught to children to help them regulate their state of arousal in order to enhance their participation in different environments and tasks (Ashburner et al., 2014; Schaaf et al., 2015). Strategies may include learning to use calming strategies and ways to communicate their emotions and needs. Finally, students were prompted to consider logistics and practical implementation of the intervention plan, including available resources and support persons, context, individual circumstances, method of outcome measurement, and plan review date (Mills, Michail, et al., 2020).

Data Collection

Student Confidence

Students in both groups completed a pre-class and post-class self-rated confidence scale designed by researchers (see Table 1). The scale consisted of five-point Likert scale statements where students indicated their agreement from strongly agree to strongly disagree, as well as an optional section for additional comments. All information collected from students was de-identified before it was stored and analyzed. Students in both groups completed the confidence scale at time 1 (before the two hour class) and at time 2 (after the two hour class).

Table 1

Likert Statements Provided to Students to Measure their Confidence

Student Confidence- Likert statements:
1. I feel confident explaining sensory processing to another person. 2. I could complete an assessment of sensory processing for a child. 3. I could provide interventions and strategies to assist a child with sensory processing difficulties. 4. The teaching materials helped my confidence in addressing sensory processing concerns. 5. I can see how sensory processing in children links with occupational therapy and occupational performance.

Student Competence

At the end of the class, students in both groups completed a 'case study sensory plan' for a designed case study which was based on a 10 year old child with ASP. The case study example 'Thalia' was contrived based on the second author's practice experience supporting many school aged children on the autism spectrum with ASP, over a ten year period. The case study described the child's sensory processing in home and school environments, her strengths, interests and everyday challenges. For example, "*Thalia is bothered by the tags in her school clothes and classroom noise. She enjoys quiet craft activities*". Students were instructed to read Thalia's case study carefully and devise a 'case study sensory plan' consisting of two sections, assessment and intervention, to support Thalia's sensory processing. All students in both groups completed the Thalia case study sensory plan at the conclusion of their tutorial class, before completing the confidence scale at time two. Each student's case study sensory plan was rated by the same external rater who was blinded to student identity and group allocation. The external rater was an occupational therapist with more than 12 years-experience supporting children with ASP. Each case study sensory plan was criterion-rated according to a set rubric developed by the children's occupational therapy unit coordinator, which covered the description of individual senses and how they impacted the child's occupations. The rubric also covered interventions which were based on common interventions prescribed for ASP, including provision of activities to support the child, changes to the environment and teaching the child new skills. The rubric had eight sections, with each section rated from 0 (blank or no detail) to 4 (good accuracy and detail). Students were assigned a score for each individual assessment and intervention criteria, sub-scores for the assessment and intervention planning components, and a total score for the overall case study activity. Students were able to review the rubric at the time they signed up to the study, prior to completion of the case study activity.

Data Analysis

The Statistical Package for Social Sciences (SPSS, Version 25) was used to analyze the data. Data were initially entered into a Microsoft Excel spreadsheet, then transferred into SPSS. Descriptive statistics, including the mean and standard deviation, were used to characterize the sample for both confidence and competence outcomes (Portney & Watkins, 2015). For student confidence,

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univariate analysis of variance (ANOVA), was used to determine whether there were differences in total confidence scores from pre-class (co-variate) to post-class (dependent variable) and differences between the two groups (fixed factor; Portney & Watkins, 2015). For student competence, assessment and intervention sub-scores and total score were compared between The Sensory Form group and the standard teaching group using independent samples t-tests to determine whether there was a difference in competence scores between the two groups.

The minimum sample size required for independent samples t-tests in this project was calculated to be 34 per participant group, minimum of 68 to ensure 90% power with alpha set at 0.05. Sample size was calculated using G*Power software and based on the parameters used in independent samples t test, with an effect size of 0.8 using Cohen's d (Cohen, 1988). Power calculation was also completed for ANOVA analysis, revealing a sample size of 68 to be adequate for 90% and 0.05 alpha.

When a significant result was observed, effect size was measured using partial eta squared (for ANOVA analysis) with 0.01, 0.06, and 0.14 indicating small, medium and large effect sizes respectively (Cohen, 1988). Cohen's *d* was used for t-test analysis with 0.2, 0.5, and 0.8 indicating small, medium and large effect sizes respectively (Gravetter & Wallnau, 2013).

Results

Student Confidence

The average pre-class confidence score of all students was 16.1 out of 25, which increased to an average post-class confidence score for all students of 20.63, as shown in Table 2. Analysis with univariate ANOVA showed that student confidence scores significantly increased from pre-class to post-class, (F (2, 81) = 209.25, $p < 0.01$), meaning that all students were significantly more confident post-class than pre-class, according to the confidence questionnaire with a large effect (0.15) as measured by partial eta squared.

No significant differences were noted in post class confidence between the sensory form group (20.69) and usual teaching group (20.54) according to univariate ANOVA as shown in Table 2. This indicated that students who received instruction using The Sensory Form were not more confident than students who received usual teaching.

Table 2

Pre- and Post-Class Confidence Scores for Sensory Form and Usual Teaching Groups compared with Analysis of Variance (ANOVA)

	Raw score out of 25 *M* (SD)		**Univariate ANOVA**
	Pre-class confidence scores	Post-class confidence scores	Between groups for post class confidence
Sensory Form group (n = 49)	16.33 (3.19)	20.69 (2.15)	p = 0.989
Standard teaching group (n = 35)	15.77 (3.10)	20.54 (2.10)	
			Total (both groups) from pre class to post class)
Total (Both Groups Combined) (n = 84)	16.10 (3.13)	20.63 (2.12)	F(2,81), 209.25, p<0.001

Key: n = number, M = mean, SD = standard deviation, F = ANOVA F statistic

Competence

Table 3 shows the independent samples t-test revealed no significant differences between The Sensory Form group (mean = 11.98, SD= 3.1) and the usual teaching group (mean= 10.69, SD= 4.12) in the grand total competence scores, indicating that the group who received teaching content which included The Sensory Form did not obtain significantly better total competence scores on the case study activity than the usual teaching group.

Results are also presented for assessment and intervention sub-scores in Table 3. The Sensory Form group had a significantly higher average assessment score (6.69 out of 9) compared with the usual teaching group (5.09, p<0.01), with a medium to large effect (d = 0.72). In the intervention component of the case study, The Sensory Form group scored a mean of 5.29 out of 15, with the usual teaching group scoring 5.6. Independent samples t tests shown in Table 3 revealed that these scores were not different. These results indicate that The Sensory Form group was more competent in conducting an assessment for the case study activity than the usual teaching group but was not more competent in intervention planning.

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Table 3

Results from Student Competence Scores for the Case Study Activity Including Independent Samples t-test Analysis

	Group	*n*	M (SD) raw scores	*t*	*p* value	Cohen's d
Assessment total *(out of 9)*	Sensory Form	49	6.69 (1.81)	-3.39	**0.001***	0.72
	Usual teaching	35	5.09 (2.55)			
Intervention total *(out of 15)*	Sensory Form	49	5.29 (2.60)	0.56	0.58	N/A
	Usual teaching	35	5.60 (2.43)			
Grand total score *(out of 24)*	Sensory Form	49	11.98 (3.10)	-1.57	0.12	N/A
	Usual teaching	35	10.69 (4.12)			

*Key: n = number, M = mean, SD = Standard deviation, t = t-test value, *= p-value < 0.05*

Discussion

This study aimed to determine the impact of The Sensory Form on the confidence and competence of third-year undergraduate occupational therapy students in completing assessments and planning interventions for children with ASP. A number of findings were revealed and are discussed below.

First, this study found that students in both The Sensory Form and usual teaching groups increased in confidence from pre-class to post-class, but The Sensory Form group did not improve their confidence more than the usual teaching group. There may be several explanations for this finding. This was the first time that all students were exposed to any form of teaching content on ASP in children within their undergraduate degree; thus, any form of additional knowledge and skills learned may have contributed to the increase in confidence for all students. A similar study by DeCleene et al. (2015) found that third-year masters-level occupational therapy students who had received more didactical teaching and fieldwork experience were more confident in their evidence-based practice skills than first-year masters-level students with less knowledge and experience. Another contributing factor to increased confidence may have been the example-based learning approach used by the occupational therapy educator across both The Sensory Form and usual teaching groups, which is demonstrated to be effective for novice students (Schwonke et al., 2009; Van Gog & Rummel, 2010). In addition, the teaching skills of the occupational therapy educator, an experienced occupational therapist, who delivered content to students in both groups, may have also contributed to the overall increase in confidence. It is possible that The Sensory Form was equally effective in increasing students' confidence as usual teaching methods and that The Sensory Form may have been only one factor among many which contributed to the increase in confidence, however, it was not solely sufficient to significantly increase confidence.

The second finding was in relation to student competence and revealed students in The Sensory Form group scored significantly higher than the usual teaching group in the assessment component of the case study activity, but not the intervention planning component or total competence score. This finding may be explained by the structure of The Sensory Form, which provides 'step by step' guidance in identifying the senses affected in a case study of ASP, linking these with Dunn's framework (Dunn, 2014) and to participation difficulties for the child. In a recent study by Mills, Michail et al., (2020), experienced occupational therapists who reviewed The Sensory Form believed a key strength of the tool was that it prompted users to consider the impact of ASP on a child's participation and occupational performance, which is particularly important in light of the limited evidence for many interventions. Providing guidance to link ASP to its impact on participation and occupational performance is beneficial for novice therapists and students who typically have less advanced professional reasoning skills (Christensen et al., 2008). It is possible that this identified strength of The Sensory Form was reflected in The Sensory Form group's superior performance with regard to assessment of sensory processing.

In contrast, the intervention sections of The Sensory Form offers less guidance for intervention planning by simply stating the broad categories of interventions as 'Environmental Changes', 'Sensory Activities,' and 'Teaching Coping Strategies' but leaving the students to reason and determine which particular interventions would be appropriate without any additional guidance. Novice occupational therapists and students often have less advanced professional reasoning skills and are likely to benefit from more structured prompts to consider a number of specific factors that may impact their intervention planning (Mills, Michail, et al., 2020). This discrepancy in the amount of guidance provided for assessment verses intervention planning may have contributed to both The Sensory Form students' higher assessment competence results and the lack of difference between groups in intervention competence.

There is a lack of consensus among researchers and clinicians about the effectiveness of many sensory processing interventions (Ashburner et al., 2014; Schoen et al., 2019) as well as confusion regarding which interventions are considered part of the 'Sensory Activities' category, and what the desired outcomes of intervention may be (Bodison & Parham, 2018). Developers of a similar sensory processing case study activity used by Gee et al. (2017) had difficulty agreeing on the correct order of interventions from most to least appropriate, which may demonstrate that students cannot be expected to navigate the literature and make professionally sound decisions without the appropriate guidance for intervention planning. Asking students to rank interventions or choose appropriate interventions from a set number of options may be a more appropriate method of assessing their competence in intervention selection and planning (Gee et al., 2017).

It may be beneficial to revise The Sensory Form to include additional written and structured guidance for the intervention planning components, based on the best available evidence and clinical expertise. This is in agreement with findings by Mills, Michail, et al., (2020) who suggested that additional prompts should be included to

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support professional reasoning, with examples added in particular intervention sections. In addition, it may be beneficial to ask students to provide a justification for their reasoning around assessment and intervention choices as accountability for decisions is an important aspect of professional reasoning capability and allows for the practice and development of critical and reflective thinking skills (Christensen et al., 2008).

Another factor which may have impacted findings for competence and confidence is the length of time allocated to teach the content and complete the case study plan. It may be that a one-hour lecture and two-hour tutorial were insufficient for students to effectively develop their competence in intervention planning around ASP. This was the students' first exposure to such content in their degree, and they were only taught one case study example using tutored problem solving. Occupational therapists who reviewed The Sensory Form believed that users of the tool needed to have background knowledge and expertise in sensory processing, and that The Sensory Form had poor utility for users without this knowledge (Mills, Michail et al., 2020). One therapist reflected that it would be difficult to plan interventions without such expertise. This may indicate that sensory processing assessment and intervention for children could be considered a specialized practice area requiring specific knowledge and skills. Furthermore, the twenty minutes allocated to complete the case study plan may not have been long enough. Similar students in previous studies reported they would have benefited from a longer period of time in which to complete their task than the allocated one-hour (Gee et al., 2017). Significant increases were observed in students' evidence-based knowledge and skills following a 16-week evidence-based practice course for occupational therapy masters students (Crabtree et al., 2012), indicating that more time may have benefited student development of competence.

Future research studies in which The Sensory Form is taught over multiple weeks could allow students to learn the content in greater depth, practice applying their skills to multiple case studies before being assessed and potentially achieve higher competence among students in professional reasoning, particularly in relation to intervention planning. Future studies could consider teaching The Sensory Form through a combination of didactical teaching methods and fieldwork experience to support both their evidence-based knowledge and practical know-how knowledge. It may also be beneficial for students to re-visit this content later in their degree, after they have completed a practice placement block (six weeks) as they may better understand the overall occupational therapy process.

Limitations

The inability of students to access online teaching content and materials on their personal computers when completing the case study activity was a limitation of this study that was necessary to prevent contamination. This may have impacted both the confidence and competence scores of all students. In addition, the restricted time frame given to students to complete the case study activity was a limitation and was associated with conducting the study during set university class times. A third limitation may have been the use of tools to rate confidence and competence which were designed by researchers. Different findings may have been observed with different

measurement tools. Finally, the study design may have been a limitation as researchers were not able to control randomization and tutorial group allocation and this may have impacted the findings.

Implications for Occupational Therapy Education

The Sensory Form may be a useful tool for guiding students in sensory processing assessment and could be considered a useful addition to undergraduate or post graduate teaching about addressing ASP in children, in conjunction with known best practice teaching strategies. More time may be needed for students to grasp concepts more fully. Revision of The Sensory Form to include more guidance for the intervention planning component may better support students' professional reasoning processes and thereby increase their competence and confidence.

Conclusion

This study is the first to investigate The Sensory Form as a tool to provide structured guidance to occupational therapy students in their professional reasoning through the process of conducting assessments and planning interventions for children with ASP. The findings suggest The Sensory Form has the potential to develop students' competence in conducting assessments for children with ASP and further development of The Sensory Form may be beneficial in supporting developing professional reasoning for students.

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