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DEVELOPING AND VALIDATING A QUESTIONNAIRE FOR SENSORY ENVIRONMENT: A PILOT STUDY

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Abstract

Autism is a complex neurobehavioral disorder characterised by impairment in social interaction, communication, and repetitive behaviours, interests and activities. Environmental influences, such as early intervention and educational programs, have already shown to improve the quality of life for autistic. The physical learning environment also significantly improves learning outcomes for them. Therefore, architects suggested considering the learning environment to ensure that the space is convenient and comfortable for the autistic. The researchers aim to formulate the instrument for the survey that is appropriate, and the respondent understands the question better. The process to construct the questionnaire is difficult and complicated and requires verification of its usefulness before implementation. The objective is to measure instruments and analysis of their main features, reliability, and validity. The survey asked the respondents about their knowledge and awareness in their environment regarding autism. In this pilot survey 35 respondents participated. Their preference based on their knowledge and awareness regarding four-components - sensory stimulation (lighting, smell, colour and visual), sensory sensitivity (sight, sound, smell, taste, touch, proprioception, vestibular), the sensory design (acoustic, compartmentation, spatial sequencing, thresholds, escape space, sensory zoning, safety, and security) and physical learning environment (accessible, wayfinding, scale, toilet accommodation, ventilation, window, quiet room, legibility, and furniture). The researcher used the Statistical Program for Social Sciences Software (SPSS) version 25 to analyse this pilot study. The questionnaire can be generalised for real data collection with this reliable and valid research instrument.

Keywords: autism; reliability; validity; pilot test.

1.0 INTRODUCTION

Autism Spectrum Disorder (ASD) has occurred in every nation of the world and the statistic estimates from the U.S. Centers for Disease Control that 1 in 88 children have ASD (Ogawa et al., 2013). The boys are four times more likely to have autism than girls. The neurodevelopmental disorders exist across all social and economic, occurs in every racial and ethnic group and gives a life-long impact on their affected relatives (Samadi & McConkey, 2011; Altenmüller-Lewis, 2017). According to Scott (2009a), by increasing attention to the design of classrooms, architects are faced with the challenge of designing appropriate learning environments for these specific children. Therefore, this paper focuses on the development of a questionnaire or a measuring instrument that is a challenging and complicated process and needs validation before implementation. We present a methodological work on the assessment instruments and analysis of their main features, reliability, and validity. The questionnaire distributed to the respondent who involves the learning environment for autistic. The survey

asked the respondents about their knowledge and awareness in their environment regarding autism.

The researchers formulate the questionnaire based on four components that are, sensory sensitivity (sight, sound, smell, taste, touch, proprioception, vestibular), sensory stimulation (lighting, smell, colour and visual), the sensory design (acoustic, compartmentation, spatial sequencing, thresholds, escape space, sensory zoning, safety, and security) and physical learning environment (accessible, wayfinding, scale, toilet accommodation, ventilation, window, quiet room, legibility, and furniture).

2.0 LITERATURE REVIEW

This section will explain the major key concept briefly to be considered in the design. There are sensory sensitivity, sensory stimulation, sensory design, and physical learning environment (SynDLe).

2.1 Sensory Sensitivity

Sensory Sensitivity comprises two categories; firstly, High Stimulation (Hypersensitive) means over-responsive to sensory stimuli. Children with hypersensitivity can be easily overwhelmed with the environment that is disturbing at times. Such as loud or sudden noises that would make them feel physically painful (Gaines et al., 2016). It seems that they have too much information to process by the brain, causing the individual to be extremely responsive. This can result in very overwhelming feelings and can cause stress or pain in environments where others are comfortable (Ghazali et al., 2019).

Secondly, Low Stimulation (Hyposensitive) means under-responsive, as if certain sensory information goes unnoticed or certain senses are impaired (Gaines et al., 2016). They are diagnosed as hyposensitive and are often thought to be deaf. According to Gaines et al. (2016), hyposensitive often qualified as "sensory-seeking," meaning they often create or generate their own sensory experiences either for pleasure or to block out other unpleasant stimuli. Being autistic is an experience of hyposensitivity, where they process less information than what is usual. Both types of sensory sensitivity consist of sight, sound, smell, touch, taste, proprioception, and vestibular (Ghazali et al., 2019).

2.2. Sensory Stimulation

Sensory Stimulation is related to unusual responses when autistic child experiences reactions regarding acoustic, colour, smell, lighting and visual (Liss Radunovich & Kochert, 2014). As mentioned by Beaver (2006), the setting for the learning environment should consider the sensory issues to overcome the autistic needs and to help them to continue their lives and exhibit normal development. Hence, the regular classroom that is designed to stimulate the students, space should be designed to reduce sensory stimulation (Hebert, 2003).

2.3 Sensory Design

The sensory design is designed for living how space feels, sounds, looks, smells, and functions can be incredibly affecting one or more of the seven senses which can have an overwhelming effect on their life (The National Autistic Society, 2015). Research done by Paron-Wildes (2005) explained that when designing children's environments, it is essential to consider the needs of children with neurological disorders and to think through space as an experience. Therefore, an architect should consider designing spaces according to their sensory quality. Meaning that the grouping spaces into 'high-stimulus' and 'low-stimulus' areas with transition zones aiding the shift from one zone to the next (Society, 2015). When designing areas for children on the autism spectrum, it is important to have knowledge and understanding of how they experience the environment. Architects need to know that not all children are affected in the same way or to the same range. Whereas many children are

capable of learning within mainstream environments, some children require a more adapted and unique setting (Scott, 2009b).

2.4 Physical Learning Environment

According to Amirul, Che Ahmad, Yahya, Lee Abdullah, Adnan and Mohamed Noh, (2013), the learning environment is defined as the social context, psychological and pedagogical, which can affect learning, achievement and attitudes of the students. They explained more on the learning environment, and features that are in it played a major role in improving learning in schools and identified as major determinants of student learning. Learning environment capable of stimulating students to engage in the learning process and be able to influence the behaviour of students as well as to assist in the development of their skills or cognitive perception.

3.0 RESEARCH METHODOLOGY

The pilot study is essential to conduct before the actual data collection. The piloting is to observe for any potential improvement in the questionnaire designed by the researcher. The researcher aims to formulate appropriate questions and encompass all information that is essential for the study. This is to ensure that the respondent understands the question better after correction. The pilot study also used to ensure that reliability and validity were acceptable and not ambiguous. According to Bolarinwa (2015), reliability and validity can be established using a pilot test by collecting data from 20 to 30 subjects. Therefore, our pilot study conducted on 35 respondents that had an experience involved with a physical learning environment for autism and the pilot study took about three months for the respondent to respond to the questionnaire. Reliability test is done after the validity procedures are completed. The final version of the questionnaire was examined to assess its reliability. Cronbach (1951) and Taber (2018) mentioned that Cronbach's alpha is commonly used in terms of a statistic to see the reliability of instruments in published social science studies as an indicator of instrument quality.

The measures of the questionnaire based on the understanding of each key concept component. All components were measured using a 5 point Likert Scale: 1 – strongly disagree, 2 – disagree, 3 – not sure, 4 – agree and 5 – strongly agree. This is explained as follows:

- **Sensory Sensitivity (SSy)** - Comprises of over-responsive (easily overwhelmed) or under-responsive (certain senses are impaired). The items involve sight, sound, smell, taste, touch, proprioception and vestibular.
- **Sensory Stimulation (SSn)** - This is related to unusual responses in the environment and stimulates autistic children, consists of acoustic, colour, smell, lighting and visual.
- **Sensory Design (SD)** - Design element for living in which how space feels, sounds, looks, smells and affects one or more of the seven senses which can have an overwhelming effect on the life of an autistic individual. Those items comprise acoustic, spatial sequencing, escape space, compartmentation, transition zone, sensory zoning, safety and security.
- **Physical Learning Environment (PLE)** - The environment that affects the learning process for children, supports the well-being and education of children with ASD via the classroom environment. The items involve building scale, accessibility, wayfinding, toilet provision, window, ventilation/heating, threshold, legibility and furniture.

4.0 RESULTS AND DISCUSSION

Data collected from pilot study were analysed using Statistical Program for Social Sciences Software (SPSS) version 25 (SPSS Inc., Chicago, IL, USA) (SPSS, 2017). This was

performed using Cronbach's alpha. An alpha between 0.70 and 0.95 was considered acceptable, and the level of significance set at 0.05 ($\alpha < 0.05$) for all tests.

The Cronbach's Alpha value for all construct demonstrated that all items for sensory sensitivity, sensory stimulation, sensory design and physical learning environment were valid to be used to measure the concerned construct of a conducive environment for autism as the α value = 0.89 (sensory sensitivity), 0.91 (sensory stimulation), 0.96 (sensory design) and 0.96 (physical learning environment).

The Cronbach's Alpha (α) value has been presented in the research field and used to determine the level of reliability through the internal consistency for each factor. An item-to-scale value of 0.3 and above was used as the minimum value for a unidimensional scale while the scale considered reliable if the alpha value was 0.6 and above (Rahman & Md Sakip, 2015). As a result of testing validity and reliability, unaccepted values below $\alpha=0.3$ were eliminated and this process repeated until the questionnaire met the standards set by the researcher or above the value $\alpha=0.3$ to ensure that the content validity was not jeopardised (Del Greco et al., 1987). Therefore, the piloting test and there were 14 items from the questionnaire eliminated because a corrected item-to-total correlation value is below 0.3 (Rahman & Md Sakip, 2015).

5.0 CONCLUSIONS

In short, the questionnaire must test its reliability and validity. This is important to identify problems that the potential respondents might have in either understanding or interpreting a question during data collection. This is to ensure that the respondent understands the question better after correction. The pilot study also used to ensure that reliability and validity were acceptable and not ambiguous. Therefore, the researcher's expectation that the questionnaire would be reliable and valid to conduct for data collection. The findings of this study indicate that all key concept can be best measured - the sensory stimulation (lighting, smell, colour and visual), sensory sensitivity (sight, sound, smell, taste, touch, proprioception, vestibular), sensory design (acoustic, compartmentation, spatial sequencing, thresholds, escape space, sensory zoning, safety, and security) and physical learning environment (accessible, wayfinding, scale, toilet accommodation, ventilation, window, quiet room, legibility and furniture) are the essential features attributes to the conducive learning environment.

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Tarikh : 20 Januari 2023

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Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

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Setuju.

27.1.2023

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