



# Designing and Developing a Questionnaire on Autistic Learning Environment

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## Abstract

Designing and developing a new questionnaire as an instrument used in data collection need a longer time to establish. This paper describes the processes involved in designing and developing the questionnaire. This instrument is to measure awareness and knowledge among who involves in the autistic learning environment. The survey must be both valid and reliable. The researcher refers to the expertise to check the quality of the tool. Each expert independently evaluated the relevance, clarity, and the understandability of the instrument. The overall content of the questionnaire comprises of sensory stimulation, sensory sensitivity, sensory design, and physical learning environment.

**Keywords:** Autism; pre-testing; questionnaire

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## **1.0 Introduction**

Autism Spectrum Disorder (ASD) is a broad term used to refer to a set of developmental disabilities with similar core symptoms (Reynolds, 2015). According to the Center for Disease Control and Prevention, one in every 88 children is affected by autism (Hosny & Anous, 2015). The Centers for Disease Control and Prevention also reported that autism is a developmental disability that can create social, communication, and behavioural challenges (Schaffhauser, 2018). Children with ASD can have a variety of abilities and impairments, and each child is affected differently. The essential environment influenced behaviour and research done by M. Kanakri (2017) suggested that architects and designers should modify the setting for this particular community. Failure to apply the precise environment which will reflect negatively on the development of an autistic child's behaviour (Hosny & Anous, 2015). An autistic child may appear to behave unusually, and they can meltdown when they are in stressful situations. Therefore, architects and designers suggested providing an appropriate environment and design that responds to the needs of all members of society, especially for autistic children. However, designers are lack in terms of sensory issues regarding the built environment in the daily life of autism before the designing stage, especially in terms of the physical learning environment. This research objective is to develop the questionnaire to measure awareness and knowledge among who involves in the autistic learning environment. While the study aimed to describe the processes undertaken in the development and testing of questionnaires used for data collection. Before distributing a survey, the researcher refers to the expertise to check the quality of the tool. Each appointed expert independently evaluated all details regarding the relevance, the clarity, and the understandability of the questionnaire. The pre-test of a research instrument involves a critical examination of each question as to its clarity, understanding, wording, and meaning as understood by potential respondents to remove possible problems with the issue.

## **2.0 Background**

The overall content of the questionnaire comprises of sensory stimulation (lighting, smell, colour and visual). The sensory sensitivity (sight, sound, smell, taste, touch, proprioception, vestibular). The sensory design (acoustic, compartmentation, spatial sequencing, thresholds, escape space, sensory zoning, safety, and security). Finally, the physical learning environment (accessible, wayfinding, scale, toilet accommodation, ventilation, window, quiet room, legibility, and furniture). The questionnaire consistently measures what it purports to measure when properly administered (Greco, 1987). This article will define the processes involved in designing and developing the questionnaire.

## **3.0 Methodology**

The process of designing and developing a questionnaire involved a thorough understanding of the problem through an extensive literature search. A review of the literature is carried out in this research to develop a broad understanding of sensory issues. Using this

understanding, variables that significantly affect the autism identified. This 'quantitative approach' allows the data to be structured, evaluated, and analyzing data using SPSS and EXCEL. This approach will contribute to determining the 'knowledge' and 'awareness' of the participants towards the idea of creating a conducive physical learning environment for the autistic. Therefore, to develop a new questionnaire, many issues should be considered even before writing the questionnaire items.

### **3.1 Identification of Key Concept**

The process to construct the survey for the study mostly derives from Environment-Behavior research methods discussed by (Khare & Mullick, 2008). Related to objective of this research is to develop the questionnaire to measure awareness and knowledge among who involves in the autistic learning environment. The key concept captured from the previous study derives from available literature - the sensory sensitivity and sensory stimulation (Hebert, 2003; Beaver, 2006; Liss Radunovich & Kochert, 2014; Gaines, Bourne, Pearson, & Kleibrink, 2016; Gaines et al., 2016). While the existing theories of sensory design and physical learning environment for autism (Fraser, 1994; Paron-Wildes, 2005; Kilgour 2006; Society, 2015, Mostafa, 2015, Shaari & Ahmad, 2016). The key concept also creates from the researcher's experiences during the preliminary study and the extensive literature on autism. The initial exploration carried out is to deepen the understanding of the concept.

### **3.2 The Questionnaire Format**

The questionnaire designed to close-ended and self-administered by the respondent. It is hoped that respondents may be more likely to respond truthfully if they are allowed to complete the survey on their own. This format is more comfortable to administer and analyze. Therefore, the items need to written in a way that can be easily understood but also simple, short, and written in language familiar to the target respondents by the majority of the respondents (Tsang, Royse, & Terkawi, 2019).

### **3.3 The Length of Questionnaire**

The questionnaire designed to measure the necessary items. The questions should not be so long that respondents experience fatigue or loss of motivation in completing the survey (Tsang et al., 2019). They also suggested that those questions not only should a survey keep the simplest structure, but it also should consist of items that adequately represent the construct of interest to minimize measurement error. Tsang et al., (2019) mentioned that although a simple structure of questionnaire recommended, a large item needed in the early stages of the questionnaire's development as many of these items discarded throughout the development process.

### **3.4 Measure**

The researcher constructs the questionnaire referring to key concept. There are Sensory Sensitivity consists of sight, sound, smell, touch, taste, proprioception and vestibular.

Sensory Stimulation consists of acoustic, colour, smell, lighting and visual. The Sensory Design consists of the seven design criteria such as acoustics, spatial sequencing, escape space, compartmentalization, transition spaces, sensory zoning, and safety. Lastly, the physical learning environment consists of building scale, accessibility, wayfinding, toilet provision, window, ventilation and heating, threshold, legibility, and furniture. The survey is to focus specifically on the assessment of the knowledge and awareness among them who involve toward attributes to early childhood educational environments for autistic. The questionnaire consists of seven (7) sections with a total of one hundred and forty-nine (149) questions tabulated, as shown below.

Table 1: A Sectional Questionnaire Survey

Information Sheet	This section is essential for the respondent to read and understand why the research is done and what it will involve.
Instruction for rating measure	Respondent to answer all questions (5 Section) and scale their knowledge and awareness of autism concerning Sensory Sensitivity, Sensory Stimulation, Sensory Design, and Physical Learning Environment. The weightage, as shown below: 1= Strongly Disagree 2= Disagree 3= Not Sure 4= Agree 5= Strongly Agree
Section 1 <b>Demographic Data</b>	<ul style="list-style-type: none"> <li>• Job title</li> <li>• Profession</li> <li>• Gender</li> <li>• Age</li> <li>• Duration of Service</li> <li>• Have you been involved in an autism project?</li> <li>• Do you have an interest in autism design?</li> <li>• Do you have children or family members with autism?</li> </ul>
Section 2 <b>Sensory Sensitivity (SSy)</b> (30 questions)	<ul style="list-style-type: none"> <li>• Sight (5 questions)</li> <li>• Sound (5 questions)</li> <li>• Smell (5 questions)</li> <li>• Taste (5 questions)</li> <li>• Proprioception (5 questions)</li> <li>• Vestibular (5 questions)</li> </ul>
Section 3 <b>Sensory Stimulation (SSn)</b> (27 questions)	<ul style="list-style-type: none"> <li>• Acoustic (5 questions)</li> <li>• Colour (7 questions)</li> <li>• Smell (5 questions)</li> <li>• Lighting (5 questions)</li> <li>• Visual (5 questions)</li> </ul>
Section 4 <b>Sensory Design (SD)</b> (35 questions)	<ul style="list-style-type: none"> <li>• Acoustic (6 questions)</li> <li>• Spatial sequencing (5 questions)</li> <li>• Escape space (5 questions)</li> </ul>

	<ul style="list-style-type: none"> <li>• Compartmentation (5 questions)</li> <li>• Transition zone (5 questions)</li> <li>• Sensory zoning (5 questions)</li> <li>• Safety and security (6 questions)</li> </ul>
Section 5 <b>Physical Learning Environment (PLE)</b> (45 questions)	<ul style="list-style-type: none"> <li>• Building scale (5 questions)</li> <li>• Accessibility (5 questions)</li> <li>• Wayfinding (5 questions)</li> <li>• Toilet provision (5 questions)</li> <li>• Window (5 questions)</li> <li>• Ventilation and heating (5 questions)</li> <li>• Threshold (5 questions)</li> <li>• Legibility (5 questions)</li> <li>• Furniture (5 questions)</li> </ul>

(Source: Author)

### 3.5 Expert Review

Appointed expert (n=9) were selected based on their knowledge and expertise to review a questionnaire. The researcher invited them to participate and assess the 149 items in the survey. The questionnaire sent to experts in various disciplines with a request for feedback on the relevance, clarity and understandability of each item. The experts were also asked to comment and suggestion if certain components were missing. The expert was contacted by email. This is important to ascertain whether the content of the questionnaire was appropriate and relevant to the study purpose. The level of clarity for each item and the level of understandability on a Likert scale of 1-4, as shown below:

Table 2: The Rating Measure for Expert

Relevance	Clarity	Understandability
1= not relevance	1= Item is not clear	1= Item is not understandable
2= somewhat relevance	2= Item needs <b>major</b> revision to be clear	2= Item needs <b>major</b> revision to be clear
3= relevance	3= Item needs <b>minor</b> revision to be clear	3= Item needs <b>minor</b> revision to be clear
4= very relevance	4= Item is clear	4= Item is clear

(Source: Author)

The expert at their ability ensures that the items do not contain content that may be perceived as offensive or biased by a particular subgroup of respondents (Tsang et al., 2019). Development and testing through an expert usually undertaken by seven or more experts (Parsian, 2019). This research was undertaken by a professional architect, expert panels and related field research. Selected expert who involve as shown below:

Table 3: List of Experts

Expert	Profession	Working Experience
Expert 1	Occupational Therapies	More than 15 year's
Expert 2	Interventionist	Less than five year's
Expert 3	Biostatistician & Research methodologist	6-10 year's
Expert 4	Professional Architect (Designer Stage)	More than 15 year's
Expert 5	Professional Architect (Experiencing autism)	More than 15 year's
Expert 6	Professional Architect (Construction Stage)	More than 15 year's
Expert 7	Academician	11-15 year's
Expert 8	Occupational Therapist (Saudi Arabia) (Certified Therapist in Sensory Integration Therapy)	More than 15 year's
Expert 9	Special Education Educator	More than 15 year's

(Source: Author)

### 3.6 Pre-Testing Instrument

In quantitative research, pre-testing is a practice whereby researchers would test the research instrument that has been developed before its actual use to ascertain the likely problems with it (Kothari, Kumar, & Uusitalo, 2014). A pre-test should be carried out under actual field conditions on a group of people similar to the research population. The purpose is not to collect data but to identify problems that the potential respondents might have in either understanding or interpreting a question. The researcher is to determine if there are problems in understanding the way a question has worded, the appropriateness of the meaning it communicates, whether different respondents interpret a question differently, and to establish whether their interpretation is different from what was trying to convey. If there are problems, need to re-examine the wording to make it more precise and unambiguous (Kothari et al., 2014).

### 3.7 Reliability

Reliability refers to the consistency, stability and repeatability of results, that is, the result of a researcher is considered reliable if consistent results have been obtained (Mohajan, 2017). Mohajan mentioned that the better the reliability is perform, the more accurate the results; which increases the chance of making correct decision in research.

The most common internal consistency measure is Cronbach's alpha ( $\alpha$ ), which is usually interpreted as the mean of all possible split-half coefficients. It is a function of the average inter-correlations of items, and the number of items in the scale. It widely used in social sciences and other disciplines (Mohajan, 2017). It typically varies between 0 and 1, where 0 indicates no relationship among the items on a given scale, and 1 indicates absolute internal consistency. Alpha values above 0.7 are generally considered acceptable and satisfactory, above 0.8 are usually considered quite good, and above 0.9 are considered to reflect exceptional internal consistency (Cronbach, 1951) In the social sciences, the acceptable range of alpha value estimates from 0.7 to 0.8 (Mohajan, 2017).

Therefore, the survey should be clear and comprehensive enough; hence, to test the reliability of the tools, then compare the resultant subsets to reveal inconsistencies and revising the criteria accordingly.

### **3.8 Validity**

The establishing validity in research is essential to ensure that data are reliable, and the results are accurate (Mohajan, 2017). Validity is the extent to which a test or measure provides an adequate representation of the conceptual domain it is designed to cover, and the items are judged as well to valid by experts in the field (Moore & Sugiyama, 2007). Without assessing the validity of the research, it will be difficult to describe for the effects of measurement errors on theoretical relationships that are being measured (Mohajan, 2017). Regarding this research, the selected expertise from autism background are invited to review a questionnaire. They were asked for their feedback on the relevance, clarity and understandability of each item and also asked to comment and suggestion if certain components were absent.

### **3.9 Procedures**

The ethical issues considered to maintain the participants' confidentiality and privacy in the research conducted. The ethical permission obtained from the administration of the Public Works Department Malaysia and National Medical Research to undergo research in the Jabatan Kerja Raya Malaysia and Genius Kurnia. The participants will be given a set of questionnaires and inform consent to explain briefly the nature of the study to enable the participants to decide on taking part in the survey. The autonomy of the participants also emphasized in the consent. Data will be collected through a questionnaire distributed to those who involve in the autistic learning environment and architects who participate with autism project. The participant must answer and respond to all questions on the questionnaire. The completed survey will be collected from the participants, and finally, all the information about the participant is kept confidential.

### **3.10 Limitation**

The scope of study involves early intervention classrooms at the age of four to six years old in Genius Kurnia that facilitated by the government. The researcher could not get approval at the initial stage from the Autism Centre before conducting preliminaries study. Therefore, the observation was done away from the children and only visiting an empty room without autistic children. During the preliminary research, the researcher was also advised by the interventionist not to close to autistic children. This task is a challenge for her to observe the existing environment with the children occupied in the classroom. There is a limitation to approach an expert to validate the questionnaire. The selected expert did not respond and not interested in taking part in this validation phase. Moreover, the researcher has to wait for a long time for an expert to respond from reviewing the questionnaire. There are not many experts in this field, therefore researcher approach expert from oversea to review and feedback the survey.

## 4.0 Findings

The pre-test of a research instrument entails a critical examination of each question as to its clarity, understanding, wording, and meaning as understood by potential respondents to remove possible problems with the question. It ensures that a respondent's understanding of each question is by researcher intentions (Kothari et al., 2014). After the pre-test, further alterations made to the questionnaire. The overall comments from experts suggested that some question is not relevant to ask, reconsider to minimize those questions, to modify into a more proper sentence, to modify question shorter and use more positive statement. Other comments on some sentences are not understandable and unclear. It recommended that independently administered (self-completion) questionnaires are short in length and are composed mostly of closed structure questions (MacKison, Wrieden, & Anderson, 2010). Therefore, the researcher revised, strengthen the survey, send for proofreading and modified accordingly based on those comments and suggestions by the experts.

## 5.0 Discussion and Conclusion

This paper, we provided processes on how to design and develop a new questionnaire for the respondents about their knowledge and awareness regarding the autism environment. In the development of this instrument, the researcher involved an extensive literature search, reviewing the findings from existing literature and highlighting any gaps in the current research. The review highlighted the limited availability of studies reporting the development of an instrument to measure an architect's knowledge and awareness towards the autism environment. In the development of this instrument, the important is the readability level of the questionnaire. The researcher must be careful to avoid long sentences, complex terminology, acronyms or abbreviations, double-barreled, and leading questions (Ghazali, Md Sakip, & Samsuddin, 2020).

Researchers emphasized the major phases that need to be undertaken when constructing a new questionnaire. The questionnaire items should be able to relate to the theoretical construct as intended clearly. Tsang et al., (2019) explained that although such associations may be obvious to researchers who are familiar with the specific topic, they may not be apparent to other readers and reviewers. They also suggested that to develop a good questionnaire that can subsequently be applied in research, and it is crucial to invest the time and effort to ensure that the items adequately assess the construct of interest.

The development of the questionnaire for data collection is important to reduce measurement errors. The process to develop questionnaire should consider thorough on the content, design and format. Researchers entirely give attention to the understanding of the process involved in developing a survey. Not following appropriate and systematic procedures in questionnaire development, testing, and evaluation may challenge the quality and utilization of data (Radhakrishna, 2007). Although developing a questionnaire is not an easy task, the processes outlined in this paper should enable researchers to end up with surveys that are effective in the target populations during data collection.

Based on the current research, we are currently developing reliability test and validating our tool for measuring the knowledge and awareness among who involves in the autistic learning environment referring to sensory sensitivity, sensory stimulation, sensory design and physical learning environment.

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