Identifying Methodology in Designing Interior Setting Guideline of Dyslexia Learning Environment: A Review

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Abstract: Nowadays, there are a lot of dyslexia learning environment facilities available in Malaysia such as Dyslexia schools and centers due to increasing patterns of dyslexia symptoms. However, those symptoms are curable by designing a proper interior setting guideline of dyslexia learning environment as part of learning aids through sufficient research about dyslexic behavior, learning and psychological needs. The process of designing and produce an ideal guideline interior setting for Dyslexia learning environment required some effective methods. Hence, some methodology reviewed from the literature revolving around dyslexia learning environment. Furthermore, a review on methodologies used in built environment study also been reviewed as a basic guideline in finding effective methods for the interior setting guideline of Dyslexia learning environment producing process as the design involving physical aspects of built environment to be accounted. Identifying effective methodology in setting up an interior guideline requires prior identification of research aim and objectives. Therefore, thorough consideration should be performed to make sure the future research could be conducted to attain the objectives of the study. The review found that mixed methods especially content analysis either from case study, fieldwork assessment checklist, questionnaire survey and interviews were vigorously applied in Dyslexia learning environment and built environment as a whole. A mixed methods approach, which draws upon both quantitative and qualitative research methods from multiple disciplines, is often the most appropriate approach for built environment design area research. A mixed methods research design offers a platform to mix both qualitative and quantitative methods from varying disciplines to best solve even the most complex interdisciplinary research problems. One of the key challenges of mixed methods research is how to best select and mix research tactics to answer the research questions effectively. It is important to find literature and precedent if possible to justify the selection of research tactics. From those methods, a deduction mode by applying the knowledge and information through phenomenological approach of case study by researcher will be used in order to provide a comprehensive analysis and discussion of the findings.

Key words: *Methodology, Interior setting, Dyslexia, Dyslexia learning environment,*

INTRODUCTION

According to Chan and Fatimah [1], 5 to 10 percent of the world populations are dyslexic. In Malaysia alone, 1 out of 20 children are dyslexic where 314,000 students have this learning disability. The percentage of children enrolled in the special needs education system from 2010 to 2012 are increasing based on the data reported by Department of Social Welfare Malaysia [2]. This shows that the numbers of children with Dyslexia are increasing and as stated by UNICEF Malaysia (2014), 15% of the total children population have learning disability. Currently in Malaysia, there are 10 Dyslexia Centres are operating under Persatuan Dyslexia Malaysia (PDM). Moreover, there are also many public schools are available for students with learning disabilities. The classrooms in public schools are not specifically design for Dyslexia children. What worse is that children with dyslexia, dyscalculia, dysgraphia,dyspraxia, attention-deficit/hyperactivity disorder (ADHD), attention deficit disorder (ADD) and even autism are all "ostracized" and categorized as slow learners an place in one class when all

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of them require different ways of teaching. There is specific learning needs and environment need to be considered in order to tackle the children with SLD (specific learning difficulties) for learning process as segmentation, in this case is important for their learning development progress and duration to cure. Thus, a guideline in physical setting specifically for dyslexia learning environment is essential with design consideration for dyslexic children. The process of producing a friendly interior setting for dyslexia learning environment require an effective methodology for learning built environment research. An effective learning environment has a strong impact upon a person's growth, development, and performance. Finish National Board of Education, [3], mentioned "A learning environment is a learning setting consisting of the physical environment, psychological factors and social relationship". In many cases, built environment research problems usually require a combination of research planning that span across multiple disciplines. The type of research will dictate the right research methodologies that should underpin the research and data collection methods to be used. Regardless of the method or methodology adopted for the study, the data collection techniques employed must be suitable and capable of meeting the objectives of the study. This paper introduces the context and rationale for the use of selected methods, defines the most common types of methodology research designs and associated with challenges and limitations while conducting a research with mixed methods, and also provides a details of how mixed methods research can be utilized in built environment problems specifically a research of designing interior setting guideline for Dyslexia learning environment.

LITERATURE REVIEW

Methodology

Generally, there are two types of methodology to conduct a research namely, qualitative method and quantitative method.

Table 3.1. Distinctions between qualitative and quantitative data.

Quantitative Data	Qualitative Data
Based on meanings derived from numbers	Based on meanings expressed through words
Collection results in numerical and standardized data	Collections results in non-standardized data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualisation

Sources: developed from [4][5]

The methodologies mentioned have been used widely in research field. However, by definition and extraction for analysis, both methods are suitable for the research since the research need an in-depth analysis of physical aspects such as interior elements for interior setting of dyslexia learning environment. Patrik Aspers [6] stated that qualitative methodology is conducted through an intense contact with in real-life settings. It also focuses on the natural setting. The information gathered during qualitative research are proximate with the particular circumstances and considering case study and the information take into considerations. Therefore, qualitative method enables the interaction between individuals and the environment. It is related to the study of dyslexia learning environment as the area of study is social science area which required the consideration of psychology study of people with dyslexia behavior and the environment.

Mixed Methods

Mixed methods research is defined as a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative data during a single study, either concurrently or sequentially, to gain a better understanding of the research problem as cited by Creswell [7]. The rationale for mixing both quantitative and qualitative methods in a research design is grounded in the notion that neither method is sufficient by itself. Mixed methods research has significantly developed from the start and it is becoming more widely acknowledged as a valid research approach

Methodology Review of Related Research

Based on literature review, this paper has managed to summarize 17 researches on built environment related to various perspectives dated from year 2010 to 2018 as in the table below. The review emphasis on research methods and physical interior setting from previous findings with critical analysis.

Table 1. Research summary from the review of built environment study.

No	Author	Research Focus	Techniques	Types of Method
1	Abdullah . Fadzilah	Architectural Education PBL	Case study, documentation review, semi-structured interview, content analysis	Qualitative Method
2	Md. Mizanur Rashid	Reconstruction of Sompur Mahaviahara through Buddhist Religious Architectural Process	Content analysis, documentation review	Qualitative Method
3	Nurul Hamiruddin Salleh	Study of Fire Safety Management in Malaysian Heritage Building	Literature review, on site observation, interviews, questionnaires, case studies	Mixed Methods
4	Zeenat Begam Yusof	Development Guidelines for the Geodesic Dome at Pulau Payar	Semi-structured interviews, observation, checklist survey, graphic documentation, document analysis	Mixed Methods
5	Maisarah Ali	Quality in Building Construction	Inspection and assessment using checklist, survey, case studies	Mixed Methods
6	Zuraini Denan	Visual Comfort Study	Survey, field studies, laboratory experiment, simulation	Mixed Methods
7	Julia K. Day	Methods in Built Environment Research	Interview, survey, document analysis	Mixed Methods
8	Robert Haddad	Research and Methodology for Interior Designers	Questionnaires, interviews, focus groups, observations	Mixed Methods

Table 2. Summary of methodology from the review of learning environment study.

No	Author	Research Focus	Techniques	Types of Method
1	Nurul Jannah Amirul	The physical classroom learning environment	Literature studies, content analysis	Qualitative Method
2	S. Sahari & A. Johari	To improvise dyslexia learning and reading classes	Diagnostic, questionnaire, observation, content analysis	Mix Methods
3	H. Mohidin, A. Ismail, H. Ramli	Effectiveness of Kindergarten Design in Malaysia	Case studies, site observation	Qualitative Method
4	N. Jalil, Z. Kamarudin, H. Jalil	Multisensory design elements in stimulating learning environment for dyslexic children	Direct non-participant observation and analysis	Qualitative Method
5	S. Gibbs & J. Elliot	Creating early learning environment.	Quality assessment, content analysis	Qualitative Method
6	M. Lutfi Hidayetoglu, K. Yildirim	The effects of color and light on indoor	Group of participants and	Mixed Methods

, A. Akalin	wayfinding and the evaluation of the perceived environment	experimental setting	
7	Ulrike Stadler-	Learning Environment: The Influence of School and Classroom Space on Education	Content analysis	Qualitative Method
8	M. Lutfi Hidayet oglu , Kemal Yildirim , Aysu Akalin	The effects of color and light on indoor wayfinding and the evaluation of the perceived environment	Experiment, content analysis	Mixed Methods
9	Nurlela wati Ab. Jalil	Environmental Colour Impact upon Human Behaviour: A Review	Literature Review, Interview, content analysis	Qualitative Method

Table 3. Summary of techniques from the review.

Method/ Techniques	Total
Qualitative	
Literature Review	3
Case Study	5
Document Review	3
Interview	7
Content Analysis	8
Observation	6
Graphic Document	4
Document Analysis	2
Field Studies	1
Total	39
Quantitative	
Questionnaire	3
Survey	4
Experiment	3

Inspection	1
Assessment Checklist	2
Simulation	1
Focus Groups	1
Diagnostic	1
Total	16

Table 3. Summary of types of methodology from the review.

Types of Methods	Total
Qualitative	8
Quantitative	0
Mixed Methods	9

Justification of The Techniques Used

Content analysis and observation of case study research methodology was the most appropriate methodology to approach the subject studied, because it enabled the writer to look in depth at issues related to the built environment although the writer did not have control over the event. It also enabled the research to "focus on meanings, try to understand what is happening, look at the totality of each situation, and develop ideas through induction from data" as cited by Williams [8]. In this way, case study could be seen to satisfy the three tenets of qualitative research methods: describing, understanding, and explaining, providing it met the established objective. In this instance, an evaluative application of describing, understanding, and explaining the built environment implementation in the research for interior setting guideline of dyslexia learning environment was carried out to assess the effectiveness of learning educational initiatives. This type of investigation could not be done by merely quantitative techniques, due to the nature of empirical research that tends "to obscure some of the important information" to be uncovered.

The data collection methods of documentation review and interview also a strategic option to carry out the research. Document review was useful for making inferences about events, whilst focused interview was used to confirm data collected from the documentation review. In order to get first-hand accounts from specialists, the research demanded face-to-face interviews in the case study research. Besides, this focused face-to-face interview provided a humanistic validity. whilst the review of documentation provided substantial information to scientifically and iteratively corroborate the evidence from the former source, thus ultimately provided the research synthesis in the case study. This combination of interview and

documentation review as research strategies provided comparative explanations to satisfy the ethical need of confirming the validity of the stages.

Justification for a Mixed-Method Approach

A mixed-methods research design offers a platform in which to incorporate both qualitative and quantitative methods from varying disciplines to best solve the problem. This research area study utilized a mixed-methods design for three primary reasons: 1) to best suit the interdisciplinary nature of the research, 2) to better understand the research problems by identifying both broad qualitative trends and detailed quantitative results, and 3) to collect documentation and conduct interviews to help explain the results found in the quantitative phase [7].

METHODOLOGY

This topic consists of research methodology adopted for this research and how the data collected while conducting this research. It also discussed the related or similar methodologies used by the previous research. It includes in-depth readings and interview to the teachers and educator of the dyslexia centre and schools. In addition to that, a few case studies were done to be the basic guideline to find environmental-based design opportunities and ideation for the dyslexia learning environment. Furthermore, some closer site observation and measurement has been made in the actual site proposed in order to get a better analysis for the future development of design framework for dyslexia learning environment.

The Research Purpose

Ultimately, occupants' behaviors within their environment can have a tremendous impact on a process of producing a guideline of interior setting for a learning environment. Since interior elements in dyslexia learning environment setting effects learning process of dyslexic, this research specifically focused on user interactions with (and comprehension of) interior learning environment. The research process of this study is complex issue and cannot be solved by one discipline alone. The purpose of this research was to better inform future occupant dyslexic in dyslexia learning environment. Therefore, this study used an interdisciplinary and mixed methods approach to identify and assess existing occupant educational strategies, occupants' overall satisfaction, and occupants' comprehension of interior set up. Since this research blended both qualitative and quantitative research tactics, both research objectives and research

questions were used to guide the research. Some of the research questions were best answered with qualitative data and analyses, some with quantitative data and analyses, and some utilized a mixture of both.

Methodologies Adopted for the Study

The research questions are derived from the research objectives. In order to answer the research questions, several techniques are chosen for the collection of data. Table below shows the techniques adopted for the data collection.
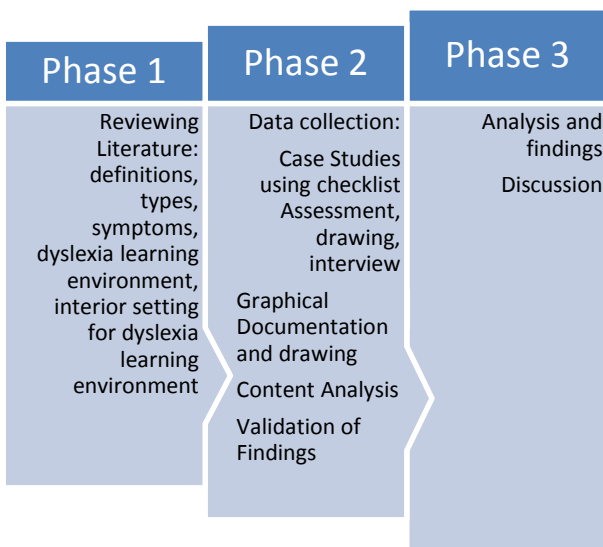
Table 1. Techniques adopted to measure research objectives

Research Objectives	Techniques	Expected Outcomes
To understand the dyslexic children's spectrums related to their learning environment.	Literature review, content analysis, observation, semi-structure interview	Definition, types, symptoms of dyslexia prior to learning needs
To review on existing interior setting of dyslexia learning environment	Semi-structure interview, observation, case study, content analysis, interior setting checklist survey, drawing and graphical documentation	Collective interior setting of selected site, basic requirement for dyslexia learning environment setting.
To formulate an interior setting guideline of dyslexia learning environment	Literature, drawing and graphical documentation to analyze all of the collected data using mixed methods	Produce interior setting guideline for dyslexia learning environment

Referring on research objectives (1) as shown on Table 3.3, literature review, content analysis, observation and semi-structured interview are required to attain the expected outcomes which is the definition, types, symptoms of dyslexia prior to learning needs. Research objectives (2) employed semi-structured interview,

observation, case study, content analysis, interior assessment checklist and some drawing and graphical documentation to gather a collective interior setting data of selected site study and basic requirement for dyslexia learning environment setting and research objectives (3) employed literature and analysing all of the data collected using mixed methods to attain the required data. Measured drawing is needed for research objectives (3) for the documentation purposes.

Figure 3.1 shows the process of collecting data for the research.

Phase 1	Phase 2	Phase 3
Reviewing Literature: definitions, types, symptoms, dyslexia learning environment, interior setting for dyslexia learning environment	Data collection: Case Studies using checklist Assessment, drawing, interview Graphical Documentation and drawing Content Analysis Validation of Findings	Analysis and findings Discussion

Justification of Selected Methodology (Mixed Methods)

The first phase of the study included literature review studies to identify the definiot of dyslexia, types, symptoms, dyslexia learning envieonment and interior setting for dyslexia learning environment. As a part of the research, literature review helps to generate and refine the research ideas . The second phase of the study implemented the data collection process through case studies selection, interior assessment checklist, drawing and interview with the teahcers and experts. In the third phase of the study require the content analysis, document of skethes, drawing and all graphical documentation to be furher analysed and discussed to attain the findings. This research could have been approached in multiple ways, but a sequential

explanatory mixed-methods design was the most logical choice for the research questions posed in this study.

The assessment checklist results from the second phase allowed the researcher to gain a broader understanding of existing dyslexia learning environment, which helped to identify interior elements in dyslexia learning environemnt buildings for follow-up occupant interviews and case studies. It should be noted that while there are many advantages to the selected methodology, there were also limitations.

Semi-structured questions in face-to-face interview session allowed the respondent to expose freedom of expression, yet still produced data that the researcher considered essential. Besides, the flexibility of semi-structured questions in face-to-face interview provided an opportunity to have the interview sessions appear informal, thus giving an opportunity to the interviewees to deliver data which are not usually expressed in written documentation. In addition, applying the data collection method of face-to-face interview allowed the interviewer to address further inquiry whenever necessary.

Interview was the best option as tool of data collection when looking at individuals' perception because it provided good interaction via eye contact and tone of voice, and presented emotion of verbal communication. Interview had an element of personal interaction between the researcher and the respondent not present in other forms of data collection. Through personal interaction, interviewees might give personal opinion about the issues discussed which had not been exposed in written format anywhere else.

RESULTS AND DISCUSSION

Selected Methods and Procedures

1. **Reviewing the Available Related Literature**

The first step of the research is by reviewing the related literature. Basically, the literature review was conducted to achieve objectives (1) and (2) which are identifying dyslexia spectrums prior to their learning environments. The review requires the researcher to select the related studies done by the previous researchers. The relevant information were obtained from the journals, articles and conference proceedings which can be accessed from the internet including Mendeley, Science Direct, Scopus, Academia and Google Scholar. Some of the data were also gained from the books, magazine, theses

and also YouTube. The data collected were used by identifying the interior settings elements during the site survey and throughout the data analysing stage by determining the suitable interior elements to be adopted in the guideline. Throughout the literature review stage, the researcher had an initial knowledge and understanding about the study

2. Selection of Case Study

Case study is an integration of various sources in order to obtain an in-depth understanding of the particular situation under investigation. It seeks the researcher to have an outlook of the existing dyslexia learning environment setting during the site survey. Thus, it helps in determining the detail background of the dyslexia prior to their interior setting of learning environment and closely observed on the interior elements through assessment checklist and the help of the teachers and staff available at dyslexia schools and centres.

For the interior setting study, several case studies were selected from dyslexia centres around Selangor area.

3. Semi-structured Interview

The interviewees were contacted via email, some months prior to the preparation of research questions. This correspondence was to get their personal agreement to be interviewed, as subjects of research analysis. The programme of the interview sessions, with suggested times, dates and venues of the interview sessions, was sent to the interviewees via emails. This correspondence also helped in the preparation of questions, based on the interviewees' possible experience and involvement. The interview session could be carried out only once the agreements from 10 the interviewees had been secured, and the semi-structured questions were satisfactorily prepared.

In this case study research, data collection methods were done through semi-structured interviews. Researcher provided the framework of this research study interview structure that had been generated by the research questions. Meanwhile, face-to-face interview was chosen as one of the data collection methods to explore individuals' opinion in depth about the interior setting of dyslexia learning environment.

With permission from the interviewees, note taking and tape recorder were used as aids to the interview sessions. The purpose of using tape recordings to record the conversation in the interviews sessions was to avoid missing out on data.

Besides that, data from the interview session was also recorded in textual format by means of note taking. During the interviews, the interviewer might catch some of the essence of the conversation and have reflective remarks on some of the subjects discussed. Hence, note taking was used to ensure these reflective responses

would not be forgotten after the conversation ended. The process of note taking was essential because it functioned as the collection of reflective ideas obtained while listening to the conversation, as the textual capture of emotions involved in the expression of interviewees, and as a reference during the analysis of data.

Analysis of Interview Data Process
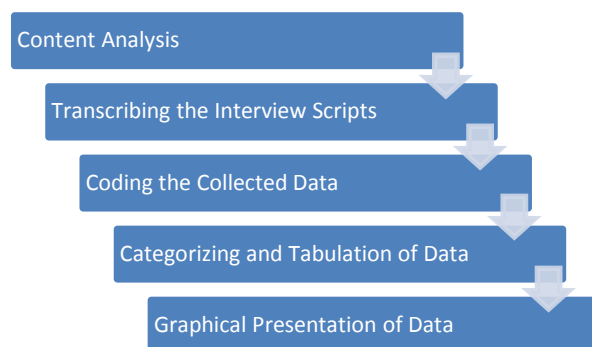
4. **Graphical Documentation and Measured Drawings**

The drawings which shows the comparison between all the selected case study of dyslexia learning environment are produced by the researcher using AutoCAD and SketchUp software programs. In this study, several techniques were employed to get the precise measurements of the selected centres. Measuring tape and digital laser measuring devices were used as an equipment to measure the details floor plan of the building. Digital laser measuring was mainly used to measure the ceiling and roof height. Plenty of pictures were taken using DSLR camera to ensure no details of the centres overlooked. All the raw measurement were recorded through drawings and sketches that was immediately made on site. The measurement was then drafted onto AutoCAD and analysed.

Physical aspects for interior setting were measured by three methods:
a) By visual inspection and assessment using checklist based on Guide to Post Occupancy Evaluation (POE)

b) By quality perception survey i.e. post-occupancy questionnaire survey with the end users (ie, teachers, staffs and students)

c) By analyzing all the checklist from all selected site study (case study). Each set of data later analyzed and the results was compared with the corresponding existing interior setting for learning in built environment before coming up with a conclusion.

Limitation of Data Collection Method

However, there was also a limitation to the method chosen. It was noticed that, although semi-structured questions were addressed to the interviewees, most of the time the answers received were not focused on the subject asked. It was difficult to control the conversation specifically around the subject asked, rather the conversation always diverted from the topic. Interrupting the experts might be considered rude, while letting them get carried away was not preferable because the researcher needed to optimize the time available for the interview sessions. More effective control of the interviews might have been possible with stronger preparatory communication skills training for the interviewer.

In this research, neither the interviewer nor interviewees were native English speakers. As such, it was expected that the conversation in the interview sessions might not go smoothly because of communication problems. However, the tape recording of the conversation would ensure all subjects discussed were captured for future transcribing of data into verbatim form. During the interview sessions, note taking was carried out as an aid for analysis to be done later. Nevertheless, note taking during conversation might result in limitation of the interaction between interviewer and interviewees, especially eye contact. Eye contact was known to be essential to see the emotion involved during discussion. The lack of eye contact might lead to an over-formalized conversation. Regarding this, one of the interviewee questioned the attempt to take notes, suggesting that he preferred an interviewer to listen to him attentively.

Case study research did not have uniform protocols , perhaps partly because the literature available on case study research was primitive and limited. Although this might be considered as providing freedom for a researcher to formulate a personal method of research, yet it does create difficulty in avoiding criticism of its primacy.

CONCLUSION

A few techniques are required to enable the research to obtain the data pertaining to setting up of dyslexia learning environment. According to the overview of the research methodology employed by the previous researchers (refer Table), it shows that the employment of mixed methodology as the method for the study is the most suitable one. Techniques for the data collection were also provided according to the research objectives that were derived from the research questions. The expected outcomes were also predicted in order to get the relevant data to the research. Case study has been chosen to get a broader exposure towards interior setting of dyslexia learning environment. Semi-structured interview was conducted with the staff, teachers, user and expert to gain the details data pertaining the subject matter, at once earn the verification from the experts based on the data collected. Graphical documentation and measured drawing were also employed to achieve the expected outcome. It helps in assessing the physical aspects of the selected dyslexia centre and classes case studies during the site survey (observation and interview with the teacher/experts) and content analysis. Structure of research methodology for the study was also illustrated in this paper which highlighted the justification of employing the data collection approach and techniques. Hence, it can be utilized in examining the interior elements and physical aspects of dyslexia learning environment.

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