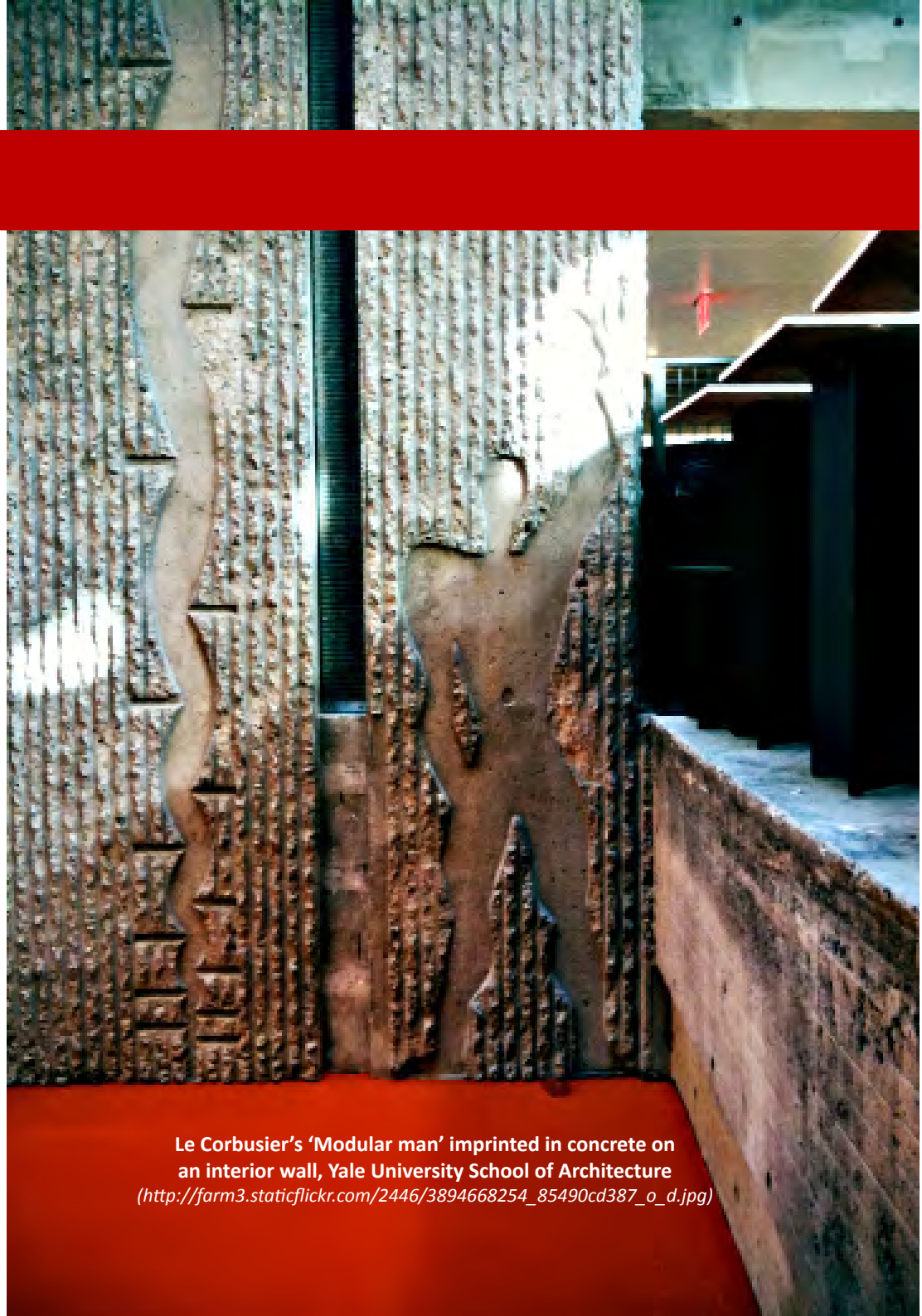
3 Methodology



Le Corbusier's 'Modular man' imprinted in concrete on an interior wall, Yale University School of Architecture
(http://farm3.staticflickr.com/2446/3894668254_85490cd387_o_d.jpg)

3. METHODOLOGY

3.1 CHAPTER OVERVIEW

The structure of this chapter reflects the two foci of the current study: 1) identifying the attributes (or variables, or criteria) that influence student satisfaction, and 2) designing and testing a questionnaire that operationalises those variables. While Chapter 2, the literature review, reviewed the theoretical underpinnings of POE and IPA, this chapter considers the application of the theory. The general principles of Post Occupancy Evaluation and Importance-Performance Analysis methodology are reviewed; and the theoretical underpinnings of questionnaire design are discussed. In this chapter the reasons for selecting a combined application of POE and IPA as the methodology for this study, will be reviewed. The process of compiling the attribute list and the data collection instrument will be explained, followed by the implementation of the pilot study and finalising the questionnaire that was used in the field.

3.2 POE AND IPA AS RESEARCH METHODOLOGY

It has been established that the 'learning environment' is the place where learners socialise and share both common and personal experiences. The learning environment can therefore be said to form a stage where the academic, social, built, and personal environments of individual learners interact to form a chapter, or an act, in the 'story' of their cognitive development.

Standards have been developed to assure quality control in building design, from pragmatic building regulations and health-and safety standards, to more specialised guidelines for designing and equipping specilised buildings. There is however, a lack of specific guidelines for professional teams tasked with the design of a school of architecture. This may seem a contentious statement, as it appears logical that qualified architects should be capable of designing schools of architecture. The school buildings discussed in the literature review, present a strong counter argument. Without carefully analysing the particular requirements of their client school, architects cannot depend on their own past experience to design schools that will satisfy future users. Importance-Performance Analysis presents architects with the opportunity to identify the shortcomings of existing schools and the priorities of the current student cohort before designing new facilities.

Institutional managers, architectural designers, and educational practitioners wish to provide a good quality learning environment. The problem is that they seldom understand this "intrinsically fuzzy and ill-defined" (Gruenewald, 2003:622) concept well enough to use the coordinated approach required to achieve student satisfaction. Surveys are often implemented in an attempt to fathom student opinions (See Annexure C). Unfortunately, the best-intended surveys are often in-house attempts that do not comply with rigorous requirements for validity and reliability (Law, 2010:252). Just as many well-intending managers or educators implement poorly designed questionnaires because they do not comprehend the intricacies of good questionnaire design, many architects design poor schools of architecture because they do not understand the intricacies of good learning environments. The many debates and research projects around the requirements for learning underscores Wilson's (1995:3) comment that "an environment that is good for learning cannot be fully prepackaged and defined". The result is that many architecture students learn about the best practices in their chosen field in poor examples of its application.

Even if evaluation of user satisfaction is done, poorly designed measurement instruments almost inevitably reflect the biases of their designers, and the researchers that use them. It is only by using psychometrically valid techniques, Nasar et al (2007:63) believe, that researchers can attempt to quantify and evaluate the perceived qualities of buildings and hope to achieve agreement across a cross section of the user population. By systematically evaluating their product and sharing their findings, architects may come to an agreement on required performance standards (Nasar *et al*, 2007:63).

The use of student feedback questionnaires is a thoroughly researched field but Law (2010) has found many shortcomings in individual instruments. Even data collection instruments based on much-used instruments such as SERVQUAL and SEEQ (Students' Evaluations of Educational Quality) are not satisfactory in Law's (*ibid*.) opinion. O'Neill and Palmer (2004:39) found that many measurement instruments are psychometrically sound, but are difficult to use.

The debate around the psychometrics of quality assurance research methods should be of interest to researchers in all fields, and careful planning is necessary in the early design process of any survey initiative. Obtaining formative feedback from users is valuable for developing a dependable research instrument. Martilla and James (1977:79) do not go into much detail about data collection in their seminal article on IPA, but do make the following recommendations:

1. Determine which attributes to measure. Overlooking important factors will limit the usefulness of the data. Developing the attribute list should begin with identifying key features of the "marketing mix" (or in the case of this study, the desired learning environment). This step is followed by a review of previous research in the same or related areas, and obtaining context-specific insight by conducting focus groups and interviews. (They also list managerial judgement as a useful tool in developing the attribute list.) Screen the attribute list by repeating these steps, to ensure that over-long questionnaires do not negatively influence the response rate.

2. Separate the importance measures from the performance measures. Asking a respondent to assess the importance of an attribute directly after considering the performance or *vice versa*, might very well influence the response to the second part of the question.

Following, is an outline of how Martilla and James's advice was adapted and implemented in this study.

3.2.1 Performance criteria and performance indicators

The debate around quality criteria for questionnaire design has been discussed, but another important consideration should is the fairness to school designers and service providers of the selected performance indicators. Building performance evaluations can easily become mired in perceptions, intuition, and guesswork (Szigeti & Davis, 2005:2). Systematic evaluation should be based on clear-cut categories with appropriate performance attributes (criteria / variables) (Lützkendorf, 2005:64). To ensure a fair and objective outcome that benefit all stakeholders in the evaluation process, assessment criteria must refer back to the initial, explicitly stated design requirements. Ultimately, a learning space should conform to Alexander *et al*'s (1979) imagining of spaces "in which man [*sic*] feels at home".

Several frameworks for the development of assessment criteria have been developed; from Parker Palmer's (1993, in Narum, 2004:63) purely subjective requirements of openness, boundaries, and an air of hospitality; to Rasila *et al* 's (2010) comprehensive list of "usability dimensions" such as efficiency, flexibility, learnability, amount/tolerance/prevention of errors, accessibility, navigation, functionality, atmosphere, visual design, interaction and feedback, and satisfaction; to the entirely quantitative requirements set by MacPhee (2007:16): good acoustics, minimal background noise, good and adjustable lighting, clear lines of sight, flexible layout, and easy circulation.

Lützkendorf *et al* (2005:61) usefully pose their framework as a series of questions:

- How are user requirements to be defined?
- Which performance attributes are to be described?
- Which indicators of capability are to be included?
- Which measurements tools are most appropriate? and
- How can the requirements of the users and the performance of the facility be compared?

Once the performance attributes have been determined, they are in turn measured with the use of performance indicators. Indicators can take many forms, for example quantitative rating scales, yes/no options or open-ended qualitative questions.

In the following section two salient examples of data collection instruments, the AUDE "Guide to Post Occupancy Evaluation", and "Lessons learned from schools of architecture", are analysed.

3.2.2 Data collection

The primary goal of this study is to prove the hypothesis that there are common patterns in the learning place-related requirements of architecture students. Once this goal had been identified the need for a data gathering process that is easy to implement at schools of architecture, easy to adapt to the context, simple to administer and above all, makes it easy to record, interpret and use the data. The data collection phase therefore had a dual function: to test the psychometric quality of the proposed data collection instrument, and to provide the data with which to test the hypothesis.

The literature review has shown the importance of using a multi-layered data collection methodology for collecting useful quantitative and qualitative data. The school case studies (see 2.6.1 Post Occupancy Evaluation and 2.6.2: Importance-Performance Analysis) indicate that while the two primary methods are questionnaires and focus group discussions, there are many other methods for data collection.

For his assessment of the use of open spaces at the University of Qatar, Salama (2009a) used both direct impressionistic observation methods such as walkthroughs, photography and behavioural mapping, and a survey questionnaire. Salama (*ibid*.) did not use focus group discussions to develop an attribute list, but to test the reliability of his data he conducted a student walkthrough evaluation of the survey results. Spooner (2008) implemented a similar research process for a POE of the Memorial Garden at the University of Georgia. For ease of analysis and comparison of the results of their meta-analysis, Nasar *et al* (2007:4) chose to use a common questionnaire-based survey. Considering its proven success, the development of the questionnaire for this study was similarly based on group discussions and a shared questionnaire.

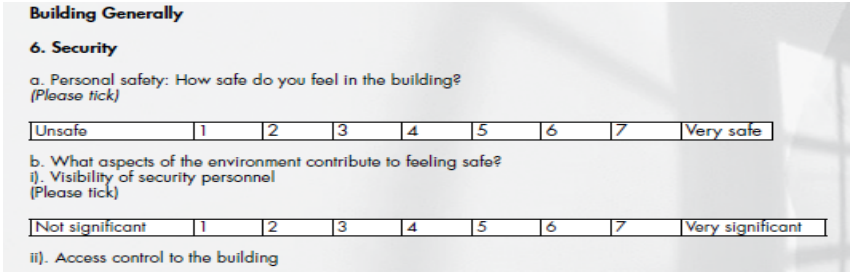
Particularly valuable precedents were the questionnaires used by the Association of University Directors or Estates (AUDE) (Blythe & Gilbey, 2006) and the template provided by Nasar *et al* (2007:245 – 252). Those two examples of data collection instruments are discussed and critiqued here, with reference to good practice standards in the fields of questionnaire design, quality assessment, and spatial design (see also 3.3.1 Questionnaire design). Conclusions are drawn about the relevance of methodology of each instrument, to the current study.

Survey precedent 1: AUDE Guide to post occupancy evaluation

Developed as a collaborative project between the Higher Education Funding Council for England (hefce) and the University of Westminster, the AUDE Guide is published as a 'good practice toolkit' for use in the Higher Education sector (Blythe & Gilbey, 2006:3). Similar to the FAMU SoA study (Zimring, 1983), and the 'Lessons learned' study by Nasar *et al* (2007), the AUDE toolkit covers a POE process from post construction / initiation, to occupation and strategic review. Only the most relevant component, 'Template 6: Sample occupant survey questionnaire' (*ibid*.:44-50) (see Annexure D) is discussed here.

AUDE Template 6 evaluates the response of the occupants to their environment. The questionnaire starts with a general demographics section and includes questions about the hours per day that occupants spend inside the building, and in particular those spent using computers. Next, a 'location' section covers the building or campus in general. Feedback is gathered on occupants' use of particular locations and their opinion of the quality, security and accessibility of those. The aim is to gain insight into respondents' wellbeing while on campus. The final section covers the indoor environmental quality of specific locations such as individual classrooms. Blythe and Gilbey (*ibid*.:44) suggest that to make data analysis and comparison easier, this section of the questionnaire is copied and used unchanged for each separate space.

Quantitative data are gathered using 7-point anchored rating scales (*Fig*. 61). Quantitative feedback is invited with the use of open ended questions.



Building Generally

6. Security

a. Personal safety: How safe do you feel in the building?
(Please tick)

Unsafe	1	2	3	4	5	6	7	Very safe

b. What aspects of the environment contribute to feeling safe?
i). Visibility of security personnel
(Please tick)

Not significant	1	2	3	4	5	6	7	Very significant

ii). Access control to the building

Figure 61: AUDE questionnaire, typical 7-point anchored rating scale (AUDE, 2006:46).

Relevant and positive aspects of the AUDE questionnaire:

- The toolkit is, unlike most other similar instruments, specifically aimed at educational institutions
- The spaces referred to, and the questions asked are applicable to the current study
- A concise introduction phrase is included (Blythe & Gilbey, 2006:44):

  We are conducting an evaluation of your building to assess how well it performs for those who occupy it. This information will be used to assess areas that need improvement, provide feedback for similar buildings and projects and to help us better manage the environment. Responses are anonymous. Please answer all the relevant questions.

A good introduction includes a compact preface, information for consent, and motivation to participate. An introduction that does not make the effort spent in completing a questionnaire seem worthwhile, can lead to non-response bias and invalid data (Czaja & Blair, 2005:5-6). The AUDE introduction explains the purpose of the survey well.

- The seven-point scale is long enough to differentiate a wide range of opinions, but not so long that it needs excessive effort to record and analyse results.

When asked to divide a continuous scale into their preferred number of categories, respondents tend to prefer between five and nine (Grover & Vriens, 2006:12; Krosnick & Presser, 2009:18). Rating scales can vary from five to 101 points, but 5-, 7- or 9-point scales are most common. The more categories, point out Grover and Vriens (*ibid*.:12), the finer the discrimination, permitting increasingly fine differentiation of opinion. Excessively small intervals though, can lead to either respondent fatigue or inaccurate responses.

- The questionnaire largely collects data in a quantitative format, making it easy to code for analysis, to record responses, and to extract statistical information.
- The questionnaire includes a brief open-ended section, allowing for qualitative input.

Open-ended questions permit respondents to express themselves without being restricted to a limited list of options and can result in richer data. Open questions are particularly popular in self-administered written questionnaires – as Czaja and Blair (2009:20) observe, they "seem natural" to the format, but they are also more complex to answer and interpret. The number of such questions should be limited. Open-ended questions are ideal for exploratory studies, when the underlying motivations, beliefs and attitudes or a target population is assessed (Grover & Vriens, 2006:8).

Negative / non-relevant aspects of the AUDE questionnaire:

- The questionnaire starts with asking personal information that may be sensitive.

The amount of information a respondent is willing to give depends on the sensitivity of the information requested, and respondents should within reason, be able to ask questions of the researcher. While there is an introduction phrase (discussed above), the first section on potentially sensitive demographic information does not make the purpose of the survey clear, and does not draw the respondent into the topic. Such information should be asked for at the end of the questionnaire, especially if it is not critical. Should the respondent not complete the questionnaire, more of the critical information will have been provided. Designers of questionnaires should therefore pay careful attention to the format and wording of the introduction.

To comply with general ethics requirements, the introduction must include sufficient and accurate information to allow properly informed consent to participate (Czaja & Blair, 2005:6), which the AUDE introduction does not. It mentions anonymity, but does not indicate that completion is voluntary. To ensure full ethical compliance, Nasar *et al* (2007) recommend that clearance for the administration of the survey should first be obtained with each institution's ethics clearance committee.

Conclusion

The AUDE Guide to Post Occupancy Evaluation includes several templates for use by universities and is a valuable resource in the development of this study. Schools wanting to either research the actual POE process in more depth, or want to develop a specialised POE instrument for their use, should study this instrument and its accompanying 'toolkit' with care.

Survey precedent 2: Lessons learned from schools of architecture

Nasar *et al* (2007) included a questionnaire in their meta study of schools of architecture (Annexure D). The questionnaire is divided into five parts: the first part collects background information about the building project; the second, about the exterior appearance of the building; the third part is a POE of the building and its spaces; and the fourth and fifth parts relate to survey administration aspects such as coding and data analysis. The second and third parts are specifically applicable to the current study and are discussed further here.

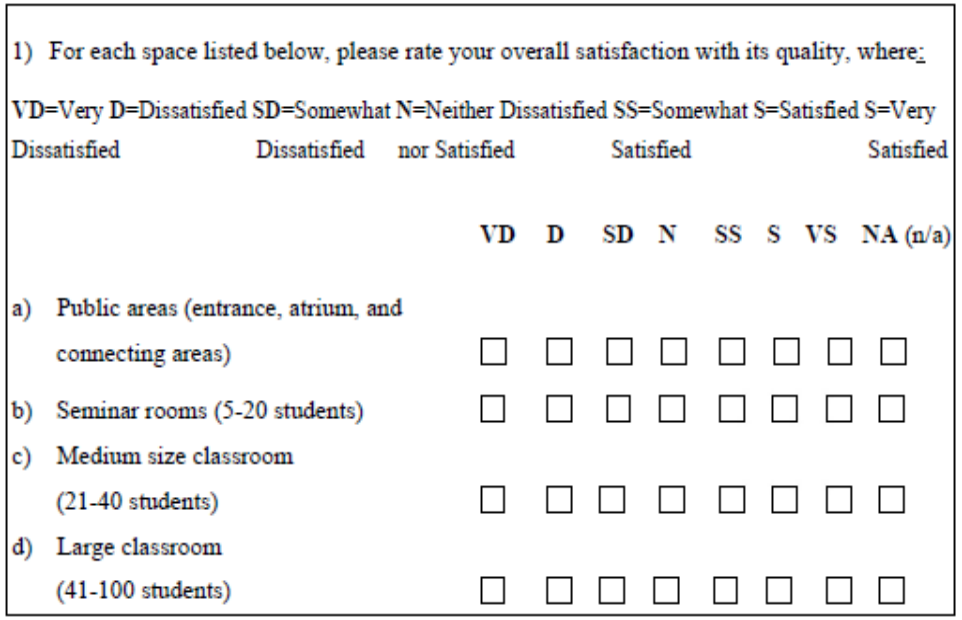
The authors recommend a standardised procedure for administering the POE. As leaving surveys in mailboxes, or asking members of staff to implement the questionnaire on behalf of the researcher seldom results in the required responses rates, the researcher should schedule to meet students in classes and studios. All students can then complete and return the survey together.

The introduction reads as follows:

> We wish to conduct a post--occupancy evaluation (P.O.E.) [*sic*] of your facilities. Our purpose is to assess how well the facilities perform for your health, safety, security, functionality, and psychological comfort. We hope the POE will identify areas for improvement, areas that work well, and will provide information to improve facility utilization, and the design of future buildings. Your answers will be kept confidential and anonymous. There are no right or wrong answers. So feel free to give your honest opinions [Nasar, email communication, 27 December 2011] [see Annexure E].

In the original administration of the study, the second part (on the exterior of the building) was not completed by users of the building, but by passers-by. Campus users passing by a selected point, were asked to answer 16 questions covering attributes of building appearance including overall appeal; how exciting, distressing or friendly the building looks; and how well it fits the campus image.

The third part, is a 14-question survey on interior conditions followed by a demographic section at the end, is completed by building users. Categories of questions in this part are: physical features; the overall quality of the design of the facilities; dedicated spaces (studios, classrooms, *etc*.); and hours spent per space per week. Respondents are then asked to rate their satisfaction with these spaces and give reasons for their opinion (*Fig*. 62). Finally, respondents are asked to make any other suggestions for physical improvements in their facility. The questions are answered on an 8 – point tick-box scale, which includes a neutral midpoint and a 'not applicable' option.



1) For each space listed below, please rate your overall satisfaction with its quality, where:

VD=Very Dissatisfied D=Dissatisfied SD=Somewhat Dissatisfied N=Neither Dissatisfied nor Satisfied SS=Somewhat Satisfied S=Satisfied VS=Very Satisfied

	VD	D	SD	N	SS	S	VS	NA (n/a)
a) Public areas (entrance, atrium, and connecting areas)	☐	☐	☐	☐	☐	☐	☐	☐
b) Seminar rooms (5-20 students)	☐	☐	☐	☐	☐	☐	☐	☐
c) Medium size classroom (21-40 students)	☐	☐	☐	☐	☐	☐	☐	☐
d) Large classroom (41-100 students)	☐	☐	☐	☐	☐	☐	☐	☐

Figure 62: Lessons learned from schools of architecture - typical question format (Nasar et al, 2007).

Useful aspects of the questionnaire:

The introduction is concise and, as that for the AUDE survey (see above), includes most of the required information. Furthermore:-

- It is designed specifically for use in schools of architecture;
- The questionnaire has been extensively administered and tested;
- A standardised coding format is provided for ease of transferability of data;
- Analysis methods are recommended for making sense of the data;
- The rating scale includes both a neutral midpoint and a "not applicable" option.
- The sections on coding and data analysis are well explained and useful.

With reference to the last point, the use of 'forced' or 'nonforced' rating scales (Grover & Vriens, 2006:13) is controversial among survey designers. The rating scale used by Nasar *et al* (*ibid*.) is a nonforced scale as it includes neutral / no opinion / not applicable options. Krosnick and Presser (2009:37) prefer the inclusion of a "don't know" (DK) option, as it permits the respondent to indicate that a question is not answered because of a lack of knowledge, ambivalence, or question ambiguity. Other reasons for resorting to the DK option are satisficing, feeling intimidated, and self-protection.

To differentiate DK and neutral responses (which reflect actual knowledge or opinion) from those that result from satisficing (and reflect a lack of opinion) some questionnaires include open or follow-up questions to measure attitude strength. This however will increase questionnaire length which may further encourage satisficing.

Negative / non-relevant aspects of the questionnaire:

- The introduction omits to mention that completion is optional, and to ask for consent.
- The complex method of presenting the scale (*Fig*. 62), and repeating this for each question, makes the questionnaire appear complex, and longer than what it really is.

Questionnaire length has an influence on cognitive processing, such as motivation to participate, satisficing and optimising. Obtaining the best quality data is central to questionnaire design, and therefore the phenomena of 'optimising' and 'satisficing' are briefly explained here.

Optimising is the extent to which the respondent is willing to make an effort to answer questions thoroughly and in an unbiased way, in other words to give answers of high quality.

When they are doing the survey because they have to or because they feel they have to, respondents will often not put in the required effort: this is known as 'satisficing'. This tactic can be described as taking shortcuts with cognitive processing (Krosnick & Presser, 2009:5). The tendency to satisfice is influenced by task difficulty, respondent ability, and respondent motivation (*ibid*.:6).

Task difficulty is influenced by survey design (e.g. how difficult the questions are to interpret, or how much work is required to formulate the answer) and by the conditions under which the survey is completed (e.g. a distracting environment).

Respondent ability depends on whether the respondents are able to complete the complex mental tasks required to process the information, or even if they are used to thinking about the topic and have any opinions / judgements about it.

Motivation is a complex combination of need for recognition, personal importance to the respondent, belief in the usefulness of the exercise or respondent fatigue. It can also be influenced by the impression the respondent receives from the method the questionnaire is administered and presented –for example whether optimising encouraged, or not.

Conclusion

Several categories and questions in the 'Lessons Learned' questionnaire are applicable to the current study and were used in the questionnaire design process. The presentation format was however not adopted, and a simpler scale presentation format was developed.

3.3 DEVELOPMENT OF THE TRIAL QUESTIONNAIRE

Designing a questionnaire that accurately evaluates the appropriate attributes requires exact research and careful pre-testing. Meir *et al* (2009:205) succinctly observe that a "cleverly prepared questionnaire" can obtain 80 per cent of the indicators required to do an investigation. This may sound like a quick-fix solution to the researcher's needs, but as Salama (2009b:38) points out, the researcher must understand the target group's relationship with their environment: their expectations of it, how they comprehend it, adapt to it and react to it. The physical environment can facilitate, but also hinder action, and therefore the space in which teaching takes place will influence learning (Hornecker, 2005, [sp]).

The purpose of the questionnaire developed through this study is to gain insight into architecture students' conception of how their campus- and studio environment influences their teaching and learning activities. A brief discussion of the main design considerations follows here, and Table 12 summarises the processes and design issues that were considered in the development of the trial questionnaire. Note, that the "trial questionnaire" referred to here, is the questionnaire from pilot study stage, up to the final test version implemented at University D (Annexures A1, and B1 - 4).

3.3.1 Populating the questionnaire

Literature search

The Literature Review comprises an overview of current best practice in the provision of satisfactory student learning environments. Also included are examples of both good and poor learning environments at schools of architecture. The evaluations studied, were conducted either by recognised authorities in the field of Building Performance Evaluation, or by students under the guidance of experts. Through analysing these examples, an exploratory 'criteria grid' (Annexure F) was developed and from that, using a process of "intra-study replication" (Rasila *et al* (2010:148), assessment categories were developed and populated with questions.

Discussion groups

Rasila *et al* (2010:148) found that conducting interviews with individual users to develop questionnaires is inefficient, as few individuals have enough overall understanding of the overall field. Representative discussion groups on the other hand are a valuable source of information and are often used in the preliminary phases of questionnaire development (Barbour, 2007:3). Group discussions incorporate a qualitative element in the overall research process, and ensure that all attributes of importance to the target population are included in the measurement instrument and are converted to appropriate assessment criteria. A debate exists among social scientists on exactly what a 'focus group' or a 'focus group discussion' is. To avoid methodological complications, this study implements Barbour's (2007:2) approach that "[a]ny group discussion may be called a focus group as long as the researcher is actively encouraging of, and attentive to, the group interaction". Therefore, rather than conducting formal focus groups or interviews with students, less structured discussions were used to develop a performance criteria list.

Two group discussions were conducted. The first, to develop a framework of issues that are of importance to architecture students, was held with the third year architecture class group in their studio at University A. The researcher briefly explained the purpose of the discussion and the role it would play in the overall research process. During a lively session, the class voiced their opinions about the physical conditions in their studio and on the campus as a whole. Key items were recorded (*Fig*. 63).

Some issues were hotly debated (e.g. the preferred levels and points of access control) and others unanimously agreed upon (e.g. the need to reduce the noise leaking into the studio from adjoining spaces and the busy road outside). Similar to the focus groups conducted by Rasila *et al* (2010:148), some guidance was needed to keep the discussion within the framework of the research question, but the students were permitted to freely speak of their experiences as campus users. Issues such as on-site plotting facilities and the need for a better public transportation system were acknowledged but not discussed in detail.

From the discussion notes, a criteria grid was generated (see Table 11). This ensured that a broad range of issues were considered and no major considerations were omitted. The criteria recorded during the group discussion were compared to, and combined with the criteria grid developed during the initial literature review (Annexure F).

Salama (2009a) suggests walk-throughs as a way of becoming familiar with the environment to be assessed, and behavioural mapping of the users to validate the feedback. A walk-through was not necessary as the researcher is familiar with the environment on which the pilot questionnaire was based. Behavioural mapping would have been valuable, but this was not possible because the pilot was implemented at a time of the academic year when typical studio behaviour is disrupted. This was compensated for, to an extent, by asking respondents to report on their studio-use habits in the questionnaire.

Table 11: Attributes generated during group discussion on 15 August 2011

ACCESSIBILITY	
Campus	Strict access control at building entrances
	Card access at campus boundaries
	Freedom of movement within campus / building boundaries
	Traffic control at campus entrances (taxis make movement difficult and dangerous; long queues at peak times)
	Clearly visible signage
	Pleasant spaces in between buildings
	Shaded outside seating facilities
	Grassed areas for sitting
	Maintenance and patrol of perimeter fencing
Building	Toilets reasonably close to studios
	Easy movement between inside and outside
	Being able to see into other departments' spaces
	Easy interaction between students studying different disciplines
SPACES	Group workspaces (4 - 6 persons)
	Model building space
	Common inter-disciplinary social/workspace
	Permanent exhibition space for good student work
	Full-service library / information centre close by
	Private / individual workspaces
FURNITURE AND FITTINGS	Functional and attractive furniture
	Model building facilities and workshop
	Comfortable seating
	Sufficient pin-up boards
	Variety of seating types
	Lockers
FOOD	Food and drinks easily accessible close to studios
	Greater variety of food outlets on campus
INFRASTRUCTURE	Easily controlled temperature settings
	Easily controlled lighting settings
	Easily controlled ventilation settings
	Effective ventilation
	Enough plugs for operating laptops etc.
	Enough data connections
	WiFi connectivity
	Easy access to drinking water
	Acoustic control inside building
	Control of excessive noise from outside building
	Easily used waste recycling facilities
MAINTENANCE	Regular maintenance of building fabric
	Regular maintenance of building finishes
	Regular cleaning
OTHER	Health and fitness facilities (e.g. gym)
	In-house stationary shop
	Inspirational environment
	The building reflects the creativity of its occupants
	Close-by printing facilities
	Reasonably priced printing facilities
	Aesthetically pleasing buildings
	Spiritual / prayer spaces

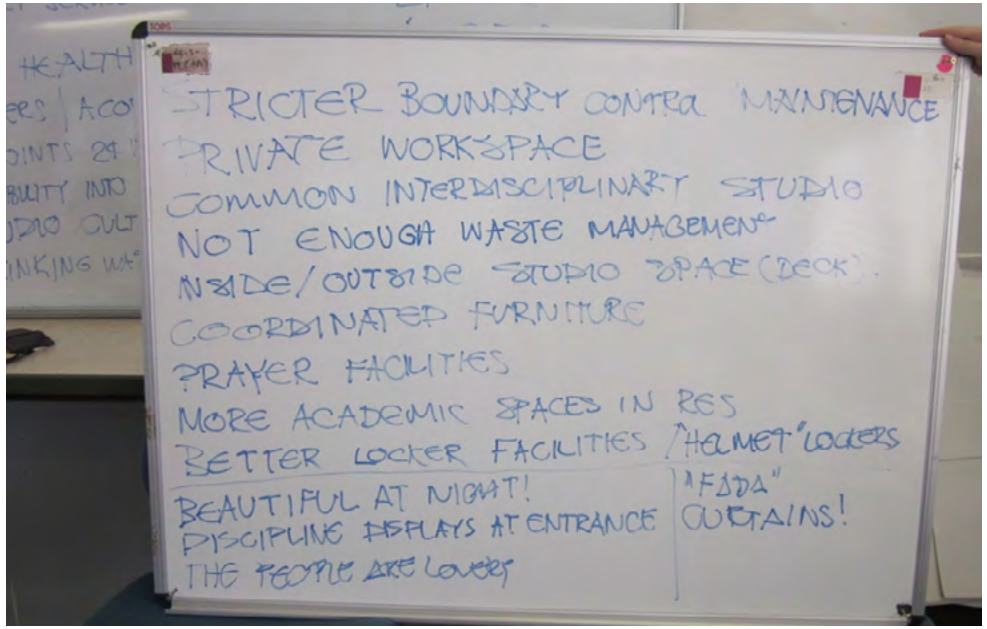


Figure 63: Some of the attributes generated and recorded in a group discussion with third year students at University A on 15 August 2011 (Author, 17.11.2011)

Regression and categorisation

Through a process of factor regression, attribute categories were developed and questions organised accordingly. Five main categories were identified, each containing groups of attributes:

- **Design and physical layout**
  - Spaces and places (15 attributes)
  - Exterior appearance and positioning (4 attributes)
- **Indoor environmental conditions**
  - Air quality
  - Thermal conditions
  - Acoustics and noise
  - Lighting
- **Infrastructure and services (11 attributes)**
- **General campus environment**
  - Outdoor learning space
  - Informal and social facilities
  - Personal safety
  - Signage and wayfinding
- **Demographic information**

Similar to Salama's (2009a:86) findings, several of the attributes crossed categories and their final positioning is a matter for judgement by the questionnaire designer. This is illustrated in Chapter 4, where attributes such as "Outdoor workspaces" are alternatively categorised under "Outdoor campus areas", and under "Spatial considerations".

3.3.2 Pilot questionnaire design

Once the criteria, or attributes to be evaluated have been identified, an instrument has to be developed to implement the evaluation in the field. As mentioned before, questionnaire design requires in-depth research and careful consideration of many diverse issues. Few designers of questionnaires for example, realise the importance of the opening question. According to Grover and Vriens (2006:17), the first question "sets the stage" by introducing the topic, gaining respondent confidence and cooperation, and establishing legitimacy. Even the issue of whether the opening question should be an open question, that allows for a written opinion, or a closed question with a rating scale or other non-written response, is debated. Czaja and Blair (2005:[sp]) prefer the use of a closed format (*Fig*. 61 and 62), as it seems less intimidating. Grover and Vriens (2006:18) however believe that people like to give their opinions and that starting with a written response tends to set respondents at ease. It also allows researchers to pre-screen respondents for familiarity with the topic and past experience early on (*ibid*.:21). Questionnaires are eminently suitable for collecting quantitative data efficiently(Grover & Vriens, 2006:2), but carefully designed open questions can also yield qualitative data to pinpoint problem areas in a given environment, and lead to strategic resolutions. Whichever approach is taken, open questions are more labour intensive to analyse, and covering as much as possible through closed questions is preferable.

The two-part question format required by IPA poses certain challenges for the questionnaire designer. Collecting sufficient data to assess all the factors that contribute to school culture through one questionnaire is probably impossible (factors such as questionnaire length, the exact representativeness of respondent groups, and the complexity of analysing such wide ranging data, all influence questionnaire design). Unless statistically derived values are used (e.g. Deng's [2008] fuzzy set theory method [2.7: Data analysis - disconfirmation theory]), the length of an IPA questionnaire is almost doubled because most questions have to be asked twice.

Response set bias may result from respondents picking up on, or perceiving a pattern in the questions, or not reading the questions properly (Preiser & Nasar, 2007:67). By changing the way in which questions are asked is one effective way of avoiding this problem. In the trial questionnaire, the questions for the two parts are placed in separate tables and worded slightly differently (refer to Annexures B2 - B4).

For the pilot study (Annexure B2), a nine-point rating scale was used, as it was at the time intended to use a method of analysis suggested by Arbore and Busacca (2010), which requires a nine-point scale. Their method, upon further review of the literature, was considered overly complicated and a seven-point scale was used in subsequent formats. Many of the precedent studies implement a five-point scale that reduces the analysis load significantly, but because of particular response to the pilot study, "It is very easy to answer especially with 9 levels of rating" a more finely differentiated seven-point scale was adopted.

In total, an average of 108 responses was gathered per student per questionnaire. This number in includes 74 rating scale questions, six Yes/No choices, two open ended questions, seven factual questions, five selections, and four that require a choice between options. The balance of the questions gathered demographic information. As the questionnaire was revised several times the exact number varied. This was especially the case with the last implementation at 'University D' as it was known beforehand that time would be limited for completion of the questionnaire. For that reason, some of the "importance" questions were omitted - a decision that would turn out to have been unwise.

Table 12: Factors to consider in the process of questionnaire and survey design

DATA COLLECTION Questionnaires as a method of data collection; Group discussions as a method of data collection
COGNITIVE PROCESSES
RESPONSE BIAS Motivation, Optimising,,Satisficing, Acquiescence, Primacy effects, Redundancy effect, Memory processes, Sensitivity to question content, Overall credibility of process.
OPEN VS. CLOSED QUESTIONS
SYNTAX AND WORDING Avoid jargon, Be concise, Keep it simple, Introduce one topic at a time, Avoid cueing, Negations and double negatives are confusing, Balanced scales.
QUESTIONNAIRE DESIGN Appearance, Questionnaire length, The opening question, Introduction, Question order, Precedents
RATING SCALES Number of scale points, Labelling of categories, No-response options.
DESIGN PROCESS Study examples, Selection of discussion group members, Drawing up an initial questionnaire, Discussion with experts in the field, A pilot study, Final revision and editing.
ACCOMPANYING DOCUMENTATION Cover page, Documentation required for ethics approval, Data recoding sheets, summary sheets.

Pilot study participant information

Table 13: Pilot study participant data

Group details	***Response rate***	***Gender***
4th year class, University A (*n*=18)	Handed out: 9 Returned: 9 pilot questionnaires, 7 'questionnaire questionnaires'	Female: 2 Male: 7

Setup and implementation of the pilot study

A questionnaire can be used as part of a structured interview as a framework for an interviewer who leads the respondent through the questions, and records the answers. An alternative is self-administered questionnaires. Because time was usually limited for completing the forms, the latter process was selected for the pilot study survey, as well as for field research at Universities A – D.

The pilot study required participants to answer two separate questionnaires. The first was similar to the trial questionnaire, but with a significant difference: varied question formats were used (Annexure A1), to obtain feedback on the preferred question format. The pilot group were asked to also complete a second questionnaire (the 'questionnaire questionnaire', Annexure A2). The pilot group were asked to give their first impression of the pilot questionnaire and the cover page, layout, rating scale formats, syntax and wording, the length of the questionnaire and the order of questions.

The intention was that the group would complete both questionnaires individually. As only a small number of the class group were present at the time of implementation, a spontaneous 'round-table' discussion / conversation developed. Students completed both questionnaires while discussing their impressions, uncertainties, and responses freely amongst each other and with the researcher. This provided an ideal opportunity to observe the respondents, to ask and answer questions. Notes were taken on problematic and successful aspects of the trial IPA questionnaire.

The unstructured discussion allowed a hybrid of discussion-led and self-administered format. Nine completed first questionnaires were handed back, and seven 'questionnaire questionnaires' were completed (two students arrived later, and did not have time to complete the latter). The outcomes of this second discussion are included in the next section and the responses are summarised in Table 14.

Pilot study feedback

Respondent feedback on the trial questionnaire was generally positive, although several indicated that non-written responses are preferred (Table 14). In response, the first (open-ended) question together with the linked "External appearance" questions, was moved to the end of the first section. The open question format was retained, as several of the precedent studies point out the importance of qualitative information to explain answers to quantitative rating scales. (When this question was moved to a later section in subsequent revisions of the questionnaire, it was often not completed.)

Other changes included 1) rewording questions such as "Do you agree with the following statements ..." which was changed to "How much do you agree with the following statements ..." ; and 2) the response code key ("1 = Totally Disagree; 9 = Totally Agree) was reworded, re-punctuated, and re-positioned in various revisions. The responses were studied and once implemented, the trial questionnaire finalised for submission to the Ethics Clearance Committee (Annexure B1).

Ethics clearance

The final step in the process of developing a trial questionnaire for application in the field, was to obtain clearance from the University Ethics Committee. The requirements for ethics clearance, the completed application form, and confirmation of approval in principle, are included as Annexure B1. Unfortunately due to the deadline for implementation, final ethics clearance could not be obtained in time. The further requirements for approval are included in the Annexure.

Table 14: Responses on pilot questionnaire format

1 First impression of questionnaire:

1 It is very easy to answer especially with 9 levels of rating
2 Well laid out
3 Very useful and relevant for informing design of educational institutions
4 Good idea, hope it affects my space
5 Very well descripted [sic] and easy to understand
6 I felt the questionnaire related a lot to our particular building (UJ) and the questions were very relevant
7 I like that there were boxes to tick and not too many written questions
8 Concise, easy to understand

	Respondent ID								SUM	Ave
2 Does the cover page	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***		
Explain purpose clearly	1	1	1	1	1	1	1	1		1.00
Motivate participation	1	0	1	1	1	1	1	1		0.88
Explain requirements	1	1	1	1	1	1	1	1		1.00
Convince about confidentiality	1	1	1	1	1	1	1	1		1.00
1 = yes 0 = no										
3 Do you agree with the statement:										
Page layour clear	3	4	4	3	4	4	3	4		3.63
Pages *too full*	3	2	2	1	1	1	1	1		1.50
Separations visually effective	4	4	4	4	4	3	3	4		3.75
Headings helpful	4	4	4	4	2	4	4	3		3.63
1 = Disagree, 4 = Agree										

4 Select preferred rating scale format:

1	1				1				2
2		1		1	1		1	1	5
3			1			1			2

5 Select preferred group rating scale format:

1	1	1	1	1	1		1	1	7
2						1			1

6 Syntax and wording

Rate opinion about wording:

Jargon	3	1	1	1	2	1	1	1	1.38
Conciseness	2	1	1	2	4	1	1	1	1.63
Ambiguous wording	1	2	3	1	4	1	1	1	1.75
Complex syntax	3	3	1	2	3	1		1	2.00
Double-barrelled questions	2	1	1	1	1	1		1	1.14
Cueing	1	1	1	1	2	1	1	1	1.13

1 = Not a problem 4 = Too much

7 Questionnaire length

Too long	1		1		1				3
Not too long		1		1		1	1	1	5
Reason if Yes									
Not interesting									0
Too many questions	1		1						2
Difficult to understand									0
Pages too full									0
Rating scale too long					1				1

8 Question order

Opening question sets the stage	4	4	4	4	3	3	1	3	3.25
First set easy to answer	4	4	4	3	4	4	1	4	3.50
First set pleasant to answer	3	4	4	3	4	4	1	3	3.25
Smooth progression between sections	3	3	4	4	2	4	1	4	3.13
None makes me feel uncomfortable	4	4	4	4	4	4	2	4	3.75

1 = Totally disagree 4 = Totally agree

Reservations?

I prefer answers that don't require any written paragraph
I don't like writing answers out

3.3.3 Lessons learned: discussion of pilot study questionnaire

The process of designing, creating, administering, and processing a survey demanded more effort and time than was initially realised and this set back the implementation stage. Another important lesson learned, was that the timing of research stages is of cardinal importance to the quality of the information that is collected. The group discussions were conducted towards the end of the academic year (the first investigative discussion in August, the discussion of the pilot questionnaire much later, in late October). By the time that the value of methodologies such as behavioural mapping became evident, classes had already come to end and it was no longer possible.

Despite setbacks and mistakes, the process described in this chapter ultimately resulted in a questionnaire that was ready for testing in the field by early November 2011 (Annexure B2). This process is discussed in Chapter 4: Results, Reports and Discussions.

3.4 CHAPTER SUMMARY

This chapter outlined the process that ended in the first version of the trial questionnaire. The reasons for selecting focus group discussions and a literature review as the primary methods for development a trial questionnaire for this study were explained. Methods of collecting the appropriate quality attributes for use in the questionnaire were reviewed, including focus groups, a literature review, and precedent studies.

Underestimation of the complexities of designing a good questionnaire often result in poorly designed research instruments and subsequently, unreliable data. For that reason, theory of questionnaire design was reviewed with particular emphasis on strategies to avoid response set bias and satisficing.

The Association of University Directors of Estates (AUDE) questionnaire and the “Lessons learned” questionnaire were analysed and assessed for their suitability as templates for this study.

The process of designing the trial IPA questionnaire was described. Finally, the implementation of the pilot study was explained, including the response to feedback.

The next chapter is an in-depth analysis of data gathered at four South African schools of architecture, using various revisions of the trial questionnaire.