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Abstract
The aim of the TEALS (Tool for Evaluation of Academic Library Spaces) project was to establish a setting for the evaluation of academic library spaces. The outcomes of such evaluation were anticipated to provide insights into the impacts of library spaces on students' learning experiences, faculty's teaching and research and lead to identifying areas of weakness and strength, developing improvement plans and defining specific goals and means for project decision makers. TEALS was developed in three phases. In the first phase of Exploratory Research, the research and practice of library planning and design along with the existing library assessment tools were reviewed. In addition, eleven academic libraries in Australia were visited. The literature review and site visits helped in identifying ten evidenced-based Criteria of Quality (CoQ) for effective and responsive library spaces. The CoQ were then linked to a number of Quality Indicators (QIs) and formed the basic elements of the TEALS framework. TEALS also included three types of data collection tools—Students’ Library Experience Survey, Observational Study Checklist and Library Staff Perception Survey—which facilitate scoring. In the second phase, Pilot Study, TEALS was trialled in Deakin University Library at Burwood campus, Melbourne, Australia. This trial of the TEALS package proved to be an obvious success providing critical information on the quality of library spaces, students’ experiences and levels of satisfaction with these spaces and library staff perceptions. The evaluation process was also found to be relatively straightforward and user-friendly. Finally, the findings of the pilot study helped in improving the package including modifications to the online survey instrument of Students’ Library Experience and development of a survey instrument for library staff and the final launch of TEALS.

1. Introduction
Academic libraries have been facing significant challenges driven by pedagogical, economic, social and cultural change. More than ever before within academic libraries, a didactic teaching approach is giving way to more student-centred approaches, e.g. collaborative learning and project-based learning. This places demands on libraries to offer a variety of spaces for independent research, access to information, team work, discussion and collaboration as well as social and informal learning. Changing student demographic in terms of a higher number of adult and working students as well as an increasing number of overseas students means that new spaces should be provided to meet students’ different needs. Libraries are also expected to be places where new technologies can be integrated to provide quick and easy access to an enormous amount of information and electronic data. Today’s libraries are no longer merely places where books and journals are stored and students are engaged in quiet reading.

While the traditional roles of academic libraries to store collections and provide quiet reading spaces are still emphasized, a new generation of academic libraries is emerging which place a significant emphasis on learners and learning. The past decade has seen significant library development in many universities to include a variety of learning spaces as well as a range of social and informal learning spaces. Existing research and post-occupancy evaluation studies of new and refurbished libraries provide important insights on the characteristics of 21st century academic libraries. Nevertheless, there is a need to better understand space utilisation in academic libraries, e.g. the ways that academic library spaces are being used and their impacts on student learning.

Among the areas of debate within academic and public libraries across the world are the use (Bryant, Matthews et al. 2009) and the right balance of different types of spaces in libraries. The factors which may determine the right balance of library spaces, e.g. student cohorts, institutions’ educational philosophies and pedagogical focus,
are also yet to be examined. Performing systematic ongoing evaluation studies of academic library spaces is an important step which facilitates the development of knowledge about effective space utilization and the balance and combination of spaces in libraries.

There is a clear gap in knowledge and availability of an appropriate and comprehensive tool to evaluate academic library spaces. Currently, there are some tools for evaluating design quality and building performance. The majority of these tools have been developed to apply to a wide range of building types. The few existing self-assessment methods developed for libraries address a few factors related to physical spaces of libraries only briefly and overlook many important issues in this regard. There is a need for an evaluation tool which has been specifically developed for academic libraries which takes into consideration a great deal of relevant influential trends, qualities and impacts.

2. Background
Realising the need for an evaluation framework to be used for structured and ongoing assessment of academic library spaces, Deakin University Library commissioned a project: Development of a Tool for Evaluation of Academic Library Spaces (TEALS) to be carried out in the Deakin University School of Architecture and Building. The aim of the TEALS project was to establish the setting for evaluation of academic library spaces, whether new or refurbished libraries. Among the purposes of TEALS were to
1. determine if library spaces function as expected and as designed,
2. examine whether library users’ needs are met or not,
3. assess the level of satisfaction of library users and library staff with the library spaces, and
4. understand the issues and problems relating to spaces not working well or not accommodating the demand of the users and staff.

3. Methodology
The TEALS framework has a simple structure built upon a set of Criteria of Quality (CoQ) and measures or Quality Indicators (QIs) against which physical spaces of any academic library can be assessed (Figure 1). Having a set of criteria or standards are essential in any evaluation study, regardless of what needs to assessed; a thing, a process, a program or a phenomenon. If the aim is to assess if spaces in an academic library are functioning well, the performance standards for academic library spaces should be established first. Simply put, it is important to have an idea about what a library space that is functioning well looks like and what characteristics it has.
3.1. Ten Criteria of Quality
Criteria of Quality (CoQ) are evidenced-based criteria developed through a review of the theory and practice of library space planning and design. Existing research on library spaces was reviewed and synthesised to achieve insights into characteristics of good library spaces and identify a set of CoQ for academic library spaces. Major studies and reports on the qualities of effective and responsive libraries were reviewed. For every work, a summary of the key factors and qualities suggested was prepared (see the bibliography for a list of papers and reports reviewed to develop the ten Criteria of Quality). This provided important insights into the qualities which have high degree of importance and appeared in many studies. In addition to the literature review, the current practice in library space planning and design was examined. A total number of ten site visits were made to academic libraries in Australia. These libraries included four library redevelopment projects at the University of Melbourne, Deakin University Libraries at Geelong Waurn Ponds and Melbourne Burwood Campus, La Trobe University Library at Melbourne Bundoora Campus, University of Ballarat Library at Mt Helen Campus, University of Queensland Library at Ipswich Campus and Macquarie University Library. The aim of these site visits was to examine the different design features and responses and identify some common planning and design principles. While none of the libraries visited could completely exemplify ideal space planning and design, each library had responded to a certain context and a set of requirements in a unique way and hence could well demonstrate some of the criteria of quality in practice. CoQ are also linked to a number of Quality Indicators (QIs) which are used as measures to evaluate the effectiveness and utilisation of a library’s physical spaces. In what follows, a summary of these measures or Quality Indicators for every Criterion of Quality is presented.

3.1.1. Positive Image and Identity
A number of principles and strategies were identified which can foster a positive image and project a clear identity for a library. The first principle is establishing the library as the intellectual hub or heart of a campus. This has to do with factors such as adjacencies, proximity to student centres and natural open areas. It is also important to invest in the external skin of a library building. In this respect, “transparency” can be considered as a factor contributing to a positive and inclusive image of a library. Students and other library users are given the opportunity
to have a glimpse of what is going on inside the library. Giving considerations to aesthetic aspects of outdoor spaces, i.e. landscaping, vegetation, pathways and seating provision, can also foster a positive friendly image. Finally, elements borrowed from the context of a library, i.e. social, cultural, natural and historical contexts, can contribute to its unique identity and image. There are a range of creative design responses in relation to this principle, depending on the special contexts of a library, its values, missions and goals. In refurbishment projects, elements from the old library may be kept as representations of the library history and its unique past.

3.1.2. Welcoming and Inviting Entry
This quality has to do with the strategies which are applied to foster in users the feeling of being welcomed, attract users through the door and encourage them to use a wide range of library facilities. A key consideration in this regard is creating an “intermediary space” which links outside and inside and functions as a space for waiting and informal meeting. The intermediary space may also incorporate a café, a gallery or exhibition space. Recent academic library redevelopment has witnessed a trend towards the provision of a café in close proximity to a library entrance and even as a part of the formal library. A number of key factors can be suggested which determine the success of the library intermediary space: a proper size and layout to accommodate multiple functions, e.g. waiting and walking in and out, comfortable and lounge type furniture with attractive design and vibrant colours and maintaining visual connections using glass walls. Newcomer students and visitors get a glimpse of the buzz of activities, interaction and learning inside a library. The intermediary space may also include food and drink vending machines.

3.1.3. Functionality and Efficiency
Library spaces should support the delivery of services and programs, accommodate the collection efficiently and meet users’ needs. One of the factors determining the functionality and effectiveness of library spaces is “size.” The size of library spaces should accommodate the functions assigned to them. There are currently some standards which can be used as a guide to work out the required size and area when planning and designing library spaces. Nevertheless, considerations need to be given to the specific contexts within which a university exists. It is also necessary that adjacencies and relationships of spaces work well and support the multiple functions of academic libraries. The materials used should last and be easy and economical to maintain. An efficient and sufficient combination of natural and artificial lighting should be provided which supports different functions of libraries and addresses students’ needs and preferences. “Control” is an important issue in this regard. Students should be able to control the artificial lighting to some degree as different individuals may have different preferences for the amount of lighting required to study or perform a task. Acoustics is another important consideration in relation to the quality of functionality and efficiency of academic library spaces. Different strategies can be applied to control the noise in library spaces including defining zones and using sound absorbing materials. Furniture used should also suit the activities, be endurable and ergonomic. The provision of appropriate storage is a particularly important consideration in relation to library staff workspace. In some libraries, students are also provided with lockers to keep their personal belongings, usually on a temporary basis. It is important to provide whiteboards, smart boards, data projection and screens etc. where appropriate. In addition, the design should incorporate elements and systems which facilitate library staff work. Examples of these supportive elements and systems are ‘automatic doors’ and ‘Automated Sorting Technologies systems’ to sort incoming/ returned items. Finally, it is necessary that proper amenities are provided for students and library staff.

3.1.4. Flexibility and Adaptability
A number of factors and issues should be considered if library spaces are to be flexible and adaptable. This includes provision of adequate number of power and data connections in appropriate locations within library spaces to maximise flexibility in the arrangement of spaces and accommodate multiple activities in the same space. Consideration also needs to be given to the building structure in terms of the location of columns and load-bearing walls so that they do not create serious barriers to the repurposing of spaces. The design of furniture, i.e. size, shape and features such as moveability and modularity, should also facilitate a range of activities and arrangements. Creative design of furniture can
also allow adding or removing parts and creating different forms and functions. Screening elements and openness of spaces are other factors which can influence the degree of flexibility of a space. The design can explore various ways to define spaces using less fixed elements including furniture, shelves, lighting, vertical elements and changing floor or ceiling heights. Finally, it is important to understand that maximising flexible and adaptable qualities of academic library spaces is not always determined by design-related strategies and spatial features. Promoting flexibility and adaptability also applies to the processes and policies which are in place within academic libraries along with the technologies integrated. For example, developing wireless networks and implementing laptop loan policies are two examples contributing to multiple uses of certain library spaces, e.g. individual carrels or silent study spaces.

3.1.5. Variety of Spaces to Cater for Different Users and Uses

The focus, the starting point of thinking about what library spaces should provide and how they should look, must be students. How they work, learn, interact and use spaces in a wide variety of ways underpins the space development. The variety of library spaces gives students the “CHOICE” to decide “where” and “when” and “how” to work and learn. We identified key categories of spaces in the academic libraries studied and closely examined their requirements along with issues which may be context-specific. These include “individual study spaces,” “group study spaces” accommodating unstructured and casual group study, “formal collaborative space” accommodating the formal group work which requires certain equipment and technologies and a higher degree of acoustic privacy, “research support spaces” and “Teaching & Presentation Spaces.” In addition to these main categories, academic libraries should provide a range of other spaces including “spaces to enrich social and personal experiences of students” and “spaces to promote inclusiveness and access of individuals with special needs.” A number of means can be applied to create and define a space and provide library users with some clues on the potential of the space and expected behaviours and tasks: furniture, colour, lighting and screening elements. Built-in furniture can provide a degree of visual and acoustic privacy while communicating certain messages to library users about appropriate and accepted uses and activities in specific library spaces. Colours also have an important impact on individuals’ moods, behaviours, motivation and nature of uses and activities.

3.1.6. Being Social and People-Centred

Information and Communication Technologies are making much of the information that students, scholars and faculty need accessible from anywhere anytime. This suggests that individuals no longer come to libraries merely to access information and study. Instead, academic libraries are increasingly becoming places for people to meet colleagues, come together for discussion, planning and preparation of collaborative works or simply to relax and spend some quiet time during class session breaks. A number of design-related considerations can be identified which represent the “people-centred” approach taken by libraries and the value placed on “people” by library designers, and higher education institutions in a broader sense. Firstly, it is important that the design leaves room for people to not only find suitable space but also make their own “place.” Small pockets of social spaces should also be created throughout the library. The interactions between students and library staff should be taken into account and informed decisions made in relation to service desk facilities. Adopting a people-centred approach to library design also requires special attention to the quality of staff workspaces. A people-centred library also provides spaces which accommodate large group gatherings and the library’s major social events. The “community gathering spaces” can be designed as purpose-built spaces. Such spaces may also be incorporated into traffic circulation spaces, i.e. entrance lobbies and stairs. Finally, a people-centred library is one developed out of collaborative planning and design processes.

3.1.7. A Sense of Place and Inspiration

In addition to contributing to students’ learning experiences and supporting their learning needs, libraries should be inspiring places where students’ engagement with learning and a sense of community are encouraged. This quality has to do with the aesthetics of space and its affective influences on library users. Making the most of any pleasant views to outside or inside and maintaining “visual connection” are among the factors which can contribute to fostering a sense of place and creating an inspirational environment.
Across a floor level, visual connection can be achieved through maximising transparency i.e. open layout and glass screens. Designing voids can also maintain visual connection across different levels of the library building. The lighting and architectural forms can also promote a sense of place. Colour schemes and furniture design can inspire students and visitors.

3.1.8. Environmental Comfort and Sustainability
This quality has to do with indoor temperature and air quality. Thermal comfort should be provided in the library spaces during the winter and summer. The library spaces should not be too humid or too dry and fresh air needs to circulate through them. In addition, the amount and quality of natural light provided in learning spaces should be adequate with little need to supplement it with artificial light. This brings to the fore attention to strategies which minimise any possible glare or excessive heat associated with natural light i.e. provision of shades and shutters to control the natural light. It is important to note that TEALS uses qualitative data to measure quality indicators related to lighting, heating and ventilation, mainly based on observation and staff and users’ comments. An in-depth scientific study of lighting, heating and ventilation is recommended to be carried out by relevant experts. Another important area in relation to this quality is sustainability. A great deal of discussion has evolved on this topic using terms such as green libraries or greening libraries (see IFLA’s Environmental Sustainability and Libraries Special Interest Group). Nevertheless, there is a need to further explore these concepts in practice and assess the impacts on library users and staff as well as management and operation costs and longer term influences. Applying the principles of sustainability in library spaces includes implementation of sustainable design features, i.e. passive ventilation and solar panels and taking into consideration the environmental impact of the building materials.

3.1.9. Access, Safety and Security
Facilitating wayfinding and encouraging readability of spaces is the first essential issue to be considered in relation to this quality. Among the strategies which can be applied to assist users in finding their way around spaces are placing signage in appropriately visible spots and maintaining clear sightlines across the library spaces. In addition, library spaces need to be safely and quickly evacuated in an emergency situation. Spaces should also be accessible for library users with special needs. The visual linking of spaces is another factor which can support accessibility and readability of spaces and contribute to a safer environment. Visual links need to be maintained across library spaces and among bookshelves. Finally, some libraries have started providing lockers for students which can be a good approach to consider. Lockers may be provided on a short-term and daily basis for students’ valuable personal belongings and as a secure source of power to charge laptops.

3.1.10. Integration of Technologies
A general principle in relation to integration of technologies into library spaces is maximising the flexibility and adaptability. Technologies change at a much faster pace and spaces need to be able to keep up with these technological changes. In addition, there are factors to be considered if technologies are to be incorporated into spaces in an effective way — not approached simply as adding a few computers. Provision of appropriate spaces for access to technologies for different purposes is one issue to be considered. Spaces for quick access to information as well as spaces for collaborative learning and teaching involving the use of and training about technologies all need to be accommodated. It is also important that the number and location of power points support students’ needs to use or charge their electronic devices. Finally, furniture design is another factor which has impacts on students’ flexible use of technologies. The size and form of the desks for computers should accommodate students’ needs and support collaboration, i.e. two or more students working together using one or more computers. Power points can be provided within desk design allowing students to charge their electronic devices while they are using them.

3.2. Data Collection Tools
The CoQ and QIs helped in developing three data collection tools which provide the input to the TEALS framework. Students’ Library Experiences is the first data collection tool. It is an online survey instrument of, which focuses on collecting quantitative data. The survey starts with a set of questions on student demographics (i.e. what is your age range? Are you a “heavy” or “light” library user? Which year level you are in? And are you a research or course work student?). It
was hypothesised that student characteristics influence their responses, i.e. satisfaction with spaces, preferences and experiences. The majority of questions on library spaces were multiple choice questions to allow gathering of quantitative data. Some open-ended questions were also included to help in collecting some richer qualitative data on spaces.

3.3. Data Analysis
For every Criteria of Quality, a score from 1 to 10 was considered. A score of 10 represents the fulfilment of that quality is the best possible way. A score of 1 suggests a major weakness in relation to each specific CoQ. Three sources of data contributed to the final score given to a certain CoQ: Students’ Library Experience Survey, a Library Staff Focus Group and an extensive Observational Study. A table lists the weight assigned to each source of data for every CoQ. For each source of data, the score given to a CoQ is multiplied by the assigned weight. The total score for a CoQ is the sum of the scores based on three sources of data.

4. Early Findings
In the pilot phase of TEALS, the tool was trialled through an evaluation study of library spaces at the Melbourne Burwood Campus of Deakin University. It was anticipated that the lessons learned in applying TEALS from this evaluation study applying TEALS would help to redesign the framework and modify data collection tools. Deakin University students at Melbourne Burwood Campus were invited via email to attend a focus group via emails. Forty students who expressed their interest were provided with a link to a draft version of the online survey instrument Students’ Library Experiences and asked to complete the survey prior to attending a focus group. Four focus groups were set up with seven to eight students in each session. These focus groups with students had two main objectives: to evaluate the Online Survey Instrument prior to rollout and to collect qualitative data on the TEALS’s ten Criteria of Quality (CoQ) for Academic Library Spaces. In addition, eight library staff attended a focus group discussing the features and challenges of the existing library spaces. These focus groups were then followed up by a structured observational study which was guided by the Observational Study Checklist.

The students who attended the focus groups pointed to some important limitations of the online survey instrument. Among the suggestions repeatedly made by students were “some survey questions are not applicable to us” and “some multiple choice questions are narrow and restrictive, leaving little room to express our opinions.” In addition, there was a common agreement among the focus group participants that some of the terms used in the survey, e.g. “architectural form” and “visual links,” are ambiguous. Students’ recommendations required some essential modifications to the Online Survey Instrument including
I. Addition of a N/A option in some multiple choice questions,
II. Inclusion of more open-ended questions to collect qualitative data and
III. Replacing some terms and presenting the questions in an easily understandable language.

Focus groups with the library staff also provided important insights into the quality and of spaces and challenges facing the operation and presentation of the physical library. These findings highlighted the importance of a structured approach to collecting data on library staff’s experiences and perceptions. Development of an online survey instrument targeted at library staff was considered as another priority in order to enhance TEALS.

5. Implications for Future Research
The TEALS package will soon be used to evaluate Deakin University libraries located at two other campuses. Enhanced versions of TEALS will also be further applied to conduct ongoing assessment of existing library spaces and any spatial transformation in the future. The lesson learned during the trial of an early prototype of TEALS highlighted its significant potential to guide both post-occupancy evaluation and ongoing appraisal of the quality and use of academic library spaces. Data analysis and strategies to facilitate this process was found to be a high priority in any further refinement of the tool. Future research should include issues relevant to the transformation and use of public library spaces and aim at developing a comprehensive evaluation framework which can be applied in those contexts.
The development of the TEALS package has made an important contribution to filling the gap in appropriate evaluation methods for academic library spaces which can provide support for long-term decision making by library managers. TEALS adopted a participatory approach to space evaluation and its data collection tools facilitated engagement of students and library staff in the process of assessing the physical library. Developed to act as a reflective tool, the TEALS package is hoped to be used at different stages of a library’s life with little adjustment. This will certainly assist libraries in performing ongoing evaluation and reflecting upon the implementation of changes reviewing the effectiveness of the new building and space refurbishment programs and enable a comparison of space utilisation over a period of years.

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Bibliography


