



# Environmental appraisal of historic buildings in Scotland: the case study of the Glasgow School of Art

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Received 10 May 2000; received in revised form 2 August 2000; accepted 23 November 2000

## Abstract

This paper is a part of an ongoing research project into the environmental appraisal of historic buildings in Scotland. It used the Glasgow School of Art (GSA) building as its research vehicle where key variables related to sound, light and heat were measured and user attitudes toward them and the building in general were surveyed and the results were statistically analysed. Preliminary recordings of sound level showed an evidence of noise nuisance in one of the GSA offices. This was largely due to the nature of sound rather than its level. This has been confirmed by user returns from the questionnaire. Also,  $L_{eq}$  levels were high in the library. Daylight levels in one of the north-facing studios were higher than required in summer and lower than the recommended standards in winter. Surprisingly, no evidence, from the questionnaire returns, was found to suggest visual and/or thermal discomfort in the studios from the very large single glazed windows. Almost all occupants attached great importance to the issue of living inside a historic building. However, this was not the preferred option when it was examined in relation to other building use issues. © 2001 Elsevier Science Ltd. All rights reserved.

*Keywords:* Noise climate; Daylight level; Visual comfort; User attitudes; Correlation

## 1. Introduction: the appraisal of buildings in use

The Glasgow School of Art building (GSA), designed by C. R. Mackintosh, is regarded as one of the great works of architecture of the turn of the century in Glasgow. Claims have been made to the significance of the environmental control system installed in the school. Some authors have also labelled the building as ‘environmentally friendly’ for achieving good passive control of sound, light and heat. However, most claims regarding the environmental significance of the GSA building have not been based on empirical investigation and measurement of environmental variables and user attitudes.

In fact, what has been said about the environmental performance of this building is part of a wider picture painted by architectural historians who tend to appraise historic buildings rather subjectively ignoring the fact that environmental variables such as light and sound are measurable and quantifiable. Sometimes discrepancies arise between the facts of the event and the interpretations of the historian, a point well argued by McClery [1]. In many cases, historic buildings

with large windows are labelled environmentally friendly for admitting sufficient quantity of daylight, but the adverse effect on the thermal environment is barely mentioned by the historian.

Another problem with the appraisal of historic buildings is the lack of specific conceptual ‘structures’ and/or ‘systems’ of appraisal developed for this special type of buildings in comparison to those aimed at ordinary buildings. This is partly to do with the lack of research/studies into the appraisal of these buildings in use, and partly due to buildings being either closed to the public or used for a purpose which in many cases is different from their original use. Somehow the GSA is an exceptional case where the building was designed as a school of art and is currently being used as a school of art.

The appraisal studies of buildings in use carried out, have been categorised into [2]:

- (a) *Descriptive appraisals:* These are of two types—type 1, called ‘subjective’ descriptions, is usually carried out by practising architects who visit the building, talk to the user and draw conclusions based on their own experience. Type 2, ‘descriptive’ appraisals, is more sophisticated than type 1 and is normally conducted by

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a team of professionals, experienced in the operational use of buildings, and the results are compared with various yardsticks.

- (b) *Socials and psychological appraisals*: These range from a simple gathering of data about buildings using questionnaires to form an overall perception to complex and detailed single variable studies which are statistically based.
- (c) *Environmental studies*: These are of two categories, the first deals with measuring the thermal, acoustic and lighting efficiency of the building envelope, whereas the second explores various aspects of human comfort inside buildings.

However, most appraisal studies have been carried out inside ordinary buildings rather than buildings with historic significance such as the GSA building. The appraisal of a historic building is different from that of a non-historic building, as it deals with issues regarding the duality between ‘use’ and ‘culture’. To keep a historic building alive means that it should be used even if the environmental conditions inside the building are below comfort standards. To bring environmental conditions to comfort levels would require changes to be made to the fabric of the building which in many cases are not permitted due to either historic preservation laws on ‘listed’ buildings or building regulations. Also, as buildings change and grow over time, some of the spaces inside historic buildings will accommodate functions that are different from those intended by the designer himself. This often results into a mismatch between ‘space’ and ‘use’, i.e. the requirements of today’s ‘activity’.

Therefore, the appraisal of historic buildings in use is a complex issue, and during such appraisals enough thought should be given to the value people attach to living/working inside these buildings. This issue should always be examined properly and in relation to, *inter alia*, the building’s environmental performance.

## 2. Technical and historic appraisal of the GSA

The Glasgow School of Art Building (GSA), built around 1907, is looked upon by many historians and art critics as one of the most significant building of the 20th Century (Fig. 1). It has been remarked that ‘Mackintosh’s response to a difficult site and demanding brief is a creative synthesis of opposites: austere and delicate, dark and bright, derivative yet innovative. The building’s sombre facade and towering outer wall owe much to the Scottish baronial tradition and the interior reveals itself to be a lively and complex set of spaces’ [3] (Fig. 2).

Examination of literature reveals that there have been so many research papers and books devoted to the study and appraisal of the GSA building, none of which was found to be empirical in nature and/or based upon instrumentation and user attitudes measurement. For example, in his Ph.D. thesis Cairns conducted a technical study that appraised



Fig. 1. A view of the GSA building showing the large windows of the north facing studios.



Fig. 2. The exhibition space above the registry. Large skylights flood the space with natural light.

descriptively the original system of warm air heating and mechanical ventilation which was fully integrated into the design and the construction of building [4]. Cairns claims that this system had a major historical significance as it was unique to the GSA, a claim that was rejected by the architect in 1897:

‘The system of ventilating suggested on the plans is by drawing from the outer air by a Blackman or other fan, a current, which being cleansed by a washing screen, passes over a heating coil. This system is almost too well known to require advocacy and has been applied with success to many well-known buildings in Glasgow’ [3, p.7].

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