

Visitor-Reported Outcomes Before and After Circulation Reorganisation in the Educational Reuse of a Hakka Weilong House

Ye Huiqi¹, *Nik Lukman Bin Nik Ibrahim^{*1}, Wang Yunxuan¹, Wang

Zhiyun¹, Luo Guohui¹

¹. Faculty engineering and built environment, National University of Malaysia, 43600 Bangi, Malaysia

HOW TO CITE: ABSTRACT

Ye Huiqi, Nik Lukman Bin Nik Ibrahim, Wang Yunxuan, Wang Zhiyun, Luo Guohui, (2026) Visitor-Reported Outcomes Before and After Circulation Reorganisation in the Educational Reuse of a Hakka Weilong House International Journal of Special Education, 41(22s), 561 - 573

Adaptive reuse can extend the service life of traditional buildings, but educational reuse also depends on whether visitors can follow the circulation system and understand the cultural relationships expressed through space. This study compared visitor-reported outcomes before and after circulation reorganisation in a Hakka weilong house adapted for educational visits. Independent visitor cohorts completed a 15-item questionnaire at T1 and T2. A total of 200 questionnaires were included, with 100 responses at each stage. Analysis comprised scale reliability testing and Welch independent-samples t tests with effect sizes. Route clarity increased from 3.10 at T1 to 4.06 at T2, visual continuity from 3.19 to 3.92, and cultural-node salience from 2.96 to 3.83. Perceived cultural legibility increased from 3.24 to 4.06, and overall evaluative response increased from 3.26 to 3.81. Perceived authenticity did not decline. Because the study used independent cohorts at a single site, the results are interpreted as stage-associated differences rather than causal effects. The findings indicate that visitor-reported circulation, cultural understanding, and evaluation can be examined together while authenticity remains a separate conservation safeguard.

COPYRIGHT STATEMENT: Copyright: © 2026 Authors. Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY)

license (<http://creativecommons.org/licenses/by/4.0/>)

Keywords: adaptive reuse; Hakka architecture; cultural legibility; wayfinding; post-occupancy evaluation; heritage education

1. Introduction

Adaptive reuse has become an important strategy for extending building life, retaining embodied cultural value, and accommodating contemporary functions within existing structures. Its contribution to sustainability extends beyond the

conservation of materials. Reuse decisions also reshape entrances, routes of movement, access hierarchies, interpretive media, and the relationships through which users encounter heritage. Accordingly, recent reviews and practice-oriented models emphasise the need to balance

physical performance, cultural significance, social benefit, operational feasibility, reversibility, and long-term management rather than treating construction completion as the endpoint of conservation (Arfa et al., 2022a, 2022b; Bullen & Love, 2011; Plevoets & Van Cleempoel, 2019; Zhang et al., 2025). From this perspective, post-occupancy evaluation is particularly important. An intervention may preserve walls, roofs, and structural components yet still fail educationally if visitors cannot orient themselves, identify culturally significant rooms, or understand how those rooms relate to one another.

Traditional Hakka dwellings provide a particularly revealing context in which to examine this problem. Tulou and weilong houses combine defensive, residential, ritual, and lineage functions within highly ordered spatial systems. Courtyards, halls, lateral wings, thresholds, ancestral spaces, and enclosing residential rings express social order through sequence, hierarchy, enclosure, and visibility. Architectural-history and space-syntax studies have shown that these dwelling types embody changing relationships between collective life, ritual centrality, and everyday circulation (Hu & Yang, 2023), while research on ancestral halls in Guangdong has connected architectural organisation with kinship relations and educational traditions (Li et al., 2023). Their rammed-earth and timber systems also represent construction knowledge that remains relevant to discussions of low-impact conservation and climate-responsive vernacular architecture (Liang et al., 2013). When such buildings are adapted for study visits, exhibitions, or community education, the building itself becomes an interpretive medium. Visitors learn not only from labels and guides, but also from moving through spatial sequences.

This educational role creates a design challenge. Historic movement patterns were formed by domestic life, lineage practices, and ritual conventions, whereas contemporary visitors commonly lack local knowledge and have limited time to build an accurate cognitive map. New shortcuts, signage, display furniture, lighting, railings, or barriers may improve accessibility and orientation, but they may also flatten spatial hierarchy or reduce perceived authenticity. Conversely, strict preservation of inherited circulation may leave culturally important spaces difficult to locate or understand. The central design problem is therefore not simply how to make movement faster, but how to increase the legibility of an existing spatial narrative through limited and reversible intervention.

Environmental legibility provides a useful bridge between architectural configuration and learning. Lynch (1960) described legibility as the degree to which environmental elements can be recognised and organised into a coherent pattern. Passini (1984) further conceptualised wayfinding as a process involving perception of information, formation of decisions, and translation of those decisions into movement. Building complexity and plan configuration influence orientation, and signage is most effective when it supports an intelligible layout rather than compensating for a fundamentally confusing one (O'Neill, 1991; Weisman, 1981). In museums and exhibition environments, spatial affordances, visual exposure, and exhibit salience can predict where visitors move and what they engage with (Nubani et al., 2018; Wineman & Peponis, 2010). These perspectives suggest that route clarity, visual continuity, and the salience of cultural nodes may affect how visitors understand both the spatial and

cultural organisation of a Hakka dwelling.

Two gaps motivate the present study. Research on Hakka spatial morphology has primarily examined architectural form and social meaning, with less empirical attention to visitor experience after adaptive reuse. In addition, post-occupancy evaluation of heritage reuse has more often emphasised technical performance, comfort, management, or operational criteria than perceived cultural understanding. A focused comparison is therefore needed to examine route experience, cultural legibility, authenticity, and visitor evaluation within the same educational setting.

This study addresses that gap through a single-case comparison of independent visitor cohorts before and after circulation reorganisation in a Hakka weilong house used for student visits. It examines whether visitors at T2 report clearer routes, stronger visual continuity, more salient cultural nodes, greater perceived cultural legibility, and a better overall evaluative response than visitors at T1, while perceived authenticity remains stable. The analysis is limited to stage differences and does not treat visitor reports as objective space-syntax measures or as proof of causal effects.

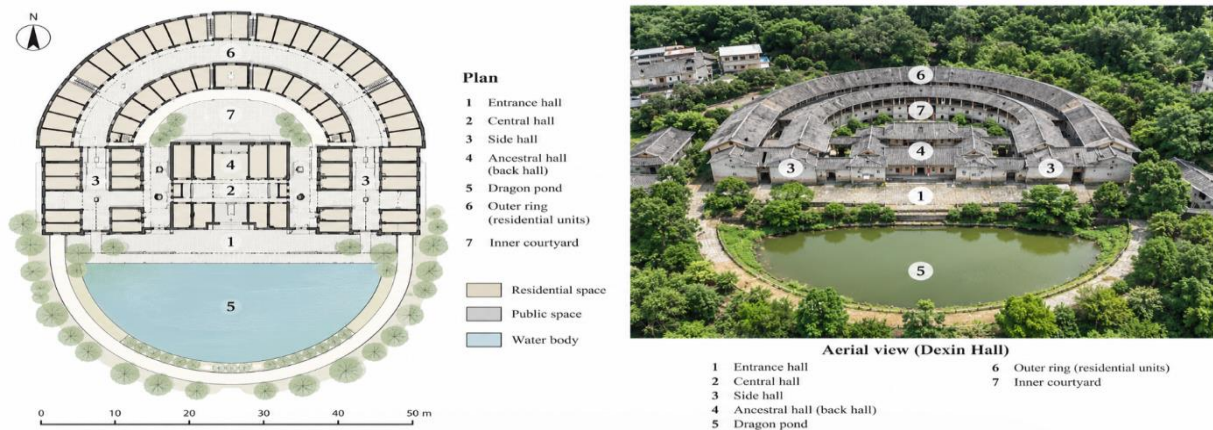


Figure 1. Ground-floor plan and aerial view of Dexin Hall, illustrating the semi-circular enclosure, axial halls, inner courtyard, lateral rooms, and front pond. Adapted from Hu and Yang (2023).

2. Theoretical Background and Hypotheses

2.1 User-centred adaptive reuse as a conservation process

Adaptive reuse is commonly justified by reduced demolition, retention of existing materials, continuity of place identity, and the restoration of economic or social utility. These benefits depend on design decisions operating at several scales. At the building scale, interventions must address structural capacity, environmental performance, accessibility, fire safety, and functional compatibility. At the experiential scale, users must be able to enter,

orient themselves, understand the building, and value the reused place. Decision-oriented studies show that heritage reuse is shaped by practical, economic, cultural, and market factors, while reuse-potential models emphasise the relationship between physical life, location, obsolescence, and adaptive capacity (Bullen & Love, 2011; Langston et al., 2008; Shipley et al., 2006). More recent frameworks organise the field around architectural, environmental, economic, social, cultural, policy, and technological dimensions (Arfa et al., 2022a; Zhang et al., 2025).

Adaptation is therefore better understood as a continuing cycle of diagnosis, intervention, use, and review than as a one-off design act. Douglas (2006) emphasised the need to coordinate existing fabric, building services, performance requirements, and changing user needs over time, distinguishing building adaptation from demolition and replacement. Heritage settings introduce additional constraints because physical alteration can modify heritage significance, authenticity, and public meaning. Implementation research has consequently argued for integrated evaluation across social, environmental, economic, institutional, and cultural dimensions rather than reliance on narrowly technical or financial assessments (Arfa et al., 2022b; Yung & Chan, 2012).

Because intended design performance and actual user experience can diverge, post-occupancy evaluation provides an appropriate perspective. Classical post-occupancy evaluation connects observations of users and operational conditions with decisions for building improvement (Preiser et al., 1988). Later building-performance research stresses that evaluation should be systematic, comparative, and capable of feeding experience back into briefing and design (Leaman et al., 2010; Li et al., 2018). Lan et al. (2026), for example, developed an evaluation framework for regenerated Hakka buildings in Meizhou that retained historic conservation as a baseline while also addressing functional adaptation, spatial use, comfort, safety, regional impact, and management. This supports the proposition that the quality of educational adaptive reuse should be assessed both through the extent to which historic fabric is safeguarded and through the effectiveness of the new educational use.

For study visits, effectiveness includes whether students can form a coherent mental representation of the dwelling and relate rooms, axes, thresholds, construction details, and ritual elements to cultural interpretation. This requirement is more specific than general satisfaction. A visit may be comfortable and attractive but educationally weak; equally, it may communicate cultural relationships yet still impose avoidable confusion. Evaluation should therefore distinguish route experience, cultural understanding, perceived authenticity, and overall response so that designers can identify which aspect of the reused environment requires adjustment.

The principle of minimum intervention provides an important constraint. Changes to circulation should remain limited, reversible where feasible, and respectful of historically significant spatial relationships. In a weilong house, opening every closed connection or imposing a single exhibition route may improve movement efficiency while weakening the contrast between formal and informal domains. A user-centred conservation approach therefore requires evidence about which spatial difficulties obstruct understanding and which retained complexities contribute to meaningful exploration.

2.2 Spatial routes and perceived environmental legibility

Visitor-reported route experience is examined through three components. Route clarity covers ease of reaching major exhibition areas, avoidance of obvious disorientation, and the progressive character of the visit sequence. Visual continuity

concerns whether visitors can identify the direction of the next destination from courtyards, halls, and related spaces. Cultural-node salience concerns whether ancestral halls, plaques, genealogical displays, and other meaningful features attract attention. These components are analysed separately rather than combined into a single spatial-route score.

The intervention logic assumes that carefully reorganised circulation will improve these perceived conditions. This expectation is consistent with wayfinding theory, which links environmental information to decision-making and movement, as well as with evidence that plan configuration, visual exposure, and spatial affordances influence contact with exhibits (Nubani et al., 2018; O'Neill, 1991; Passini, 1984; Wineman & Peponis, 2010). Because the design uses independent cohorts rather than repeated observations of the same participants, the first hypothesis concerns differences between stages rather than individual change scores.

H1. Respondents at T2 will report higher route clarity, visual continuity, cultural-node salience, perceived cultural legibility, and overall evaluative response than respondents at T1, while perceived authenticity will not decline.

3. Methods

3.1 Research design and evidential status

The evaluation uses a single-case pre-reorganisation and post-reorganisation design with independent visitor cohorts. The physical case is a Hakka weilong house adapted for educational visits. T1 represents the condition after basic repair but before circulation reorganisation, when visitors followed routes inherited from the former residential use. T2 represents the condition after circulation had been reorganised and interpretive

nodes had been introduced. Different visitor cohorts were recruited at T1 and T2 because the same school groups were unlikely to return under controlled conditions. The analysis therefore uses independent-samples procedures and does not describe the records as paired observations. The design is intended to evaluate stage-associated differences under field conditions, not to establish causal effects in the manner of a randomised controlled experiment.

Because the two cohorts were not randomly assigned, stage differences may reflect selection, history, or implementation effects in addition to the circulation reorganisation itself. Statistical significance cannot remove these design limitations (Shadish et al., 2002). The dataset used in the present analysis contains 200 records, with 100 observations at each stage. Accordingly, the results are interpreted as stage-associated differences rather than causal effects.

3.2 Spatial intervention strategy

The intervention focused on circulation and interpretation rather than major physical alteration. At T1, visitors used routes inherited from the former residential configuration, and the evaluation framework identified potential problems in route continuity, visual anticipation, and recognition of culturally important spaces. At T2, the visitor sequence was reorganised through restrained route clarification, more legible decision points, and clearer interpretive emphasis on key cultural nodes. The strategy followed the principles of minimum intervention and reversibility so that improved orientation would not depend on removing historically significant spatial relationships.

Figure 2 summarises this design logic. It is a

conceptual representation of the intervention framework rather than a measured space-syntax output. The diagram links route clarity, visual continuity, and cultural-node salience to cultural legibility while retaining perceived authenticity as a

conservation safeguard. Figures 3, Figures 4 and Figures 5 unpack the four experiential dimensions visually: route clarity, visual continuity and cultural-node saliency.

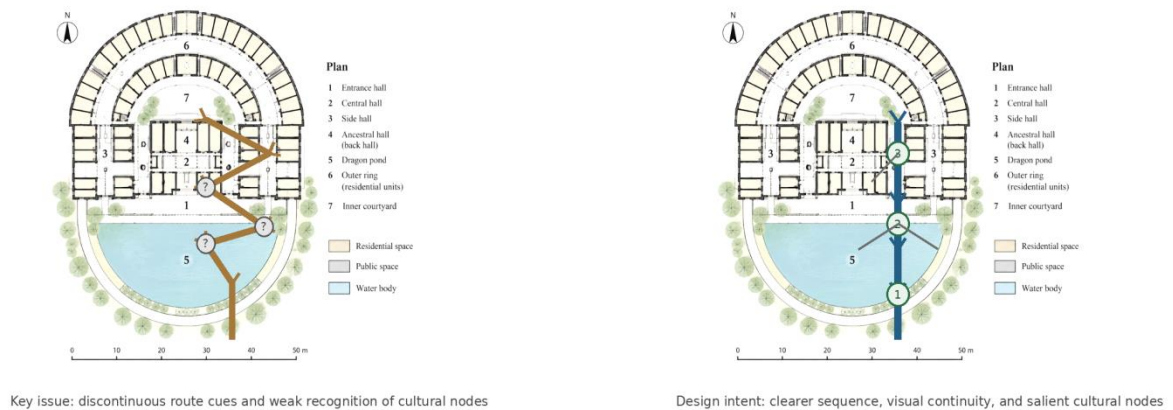


Figure 2. Conceptual pre-/post-reorganisation circulation strategy.

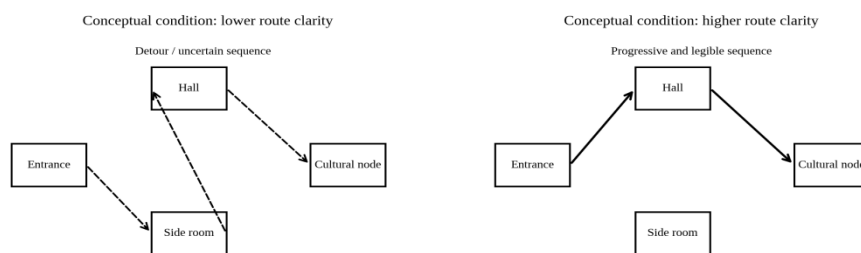


Figure 3. Conceptual illustration of perceived route clarity before and after circulation clarification.

Route clarity concerns the ease of locating major areas, avoiding obvious detours, and experiencing the visit as a progressive sequence.

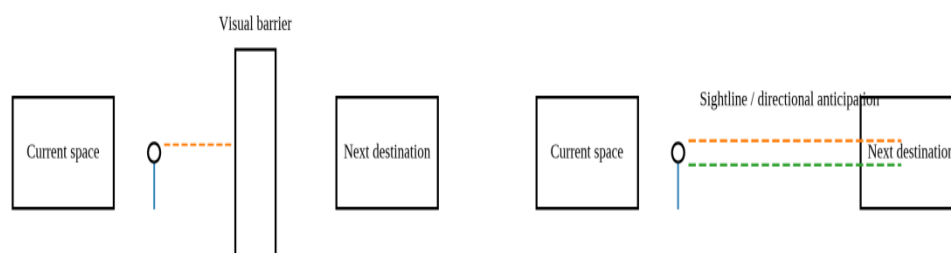


Figure 4. Conceptual illustration of visual continuity as directional anticipation between successive spaces.

Visual continuity refers to whether visitors can see, or reasonably anticipate, the direction of the next destination from courtyards, halls, and related spaces.

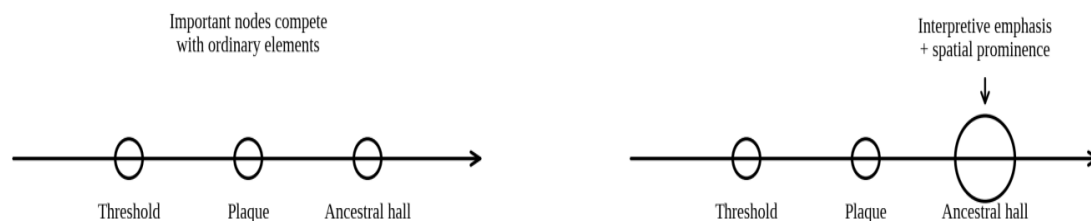


Figure 5. Conceptual illustration of cultural-node salience along the visitor sequence.

Cultural-node salience concerns the degree to which culturally meaningful features—such as ancestral halls, plaques, and genealogical displays—attract attention through spatial position, visibility, and interpretive emphasis.

3.3 Questionnaire and construct operationalisation

The questionnaire first recorded academic stage, gender, Hakka background, prior knowledge of Hakka architectural culture, survey stage, visit mode, and time spent in the building. Fifteen closed-ended items used a five-point agreement scale from 1 (strongly disagree) to 5 (strongly agree).

Perceived route clarity is the mean of items A1, A2, and A5, covering ease of route finding, absence of obvious disorientation, and the progressive character of the visit sequence. Visual continuity is measured by A4, while cultural-node salience is measured by A3. Perceived authenticity is represented by A6, which asks whether original and newly added facilities or displays preserve the historical atmosphere. Perceived cultural legibility is the mean of B1-B5, covering layout logic, lineage or ritual meaning, principal spatial functions, construction knowledge, and interest in continued

learning. Overall evaluative response is the mean of C1-C4, combining satisfaction with the spatial experience and cultural learning with recommendation and revisit intentions.

3.4 Data collection

The T1 survey was conducted from 27 July to 2 August and the T2 survey from 15 to 20 August. At both stages, student visitors were recruited after completing their visits using on-site intercept sampling. Research assistants and student volunteers distributed and collected questionnaires and provided one-to-one assistance to reduce item misunderstanding and missing data. In total, 200 questionnaires were administered on site, and all 200 were completed sufficiently for inclusion in the analysis, with 100 records retained at each stage. This figure describes completion of questionnaires that were actually administered and should not be interpreted as a population-level response rate because the total number of eligible visitors approached or declining participation was not recorded separately. Respondents were informed of the study purpose, anonymity procedures, and voluntary nature of participation, and oral or written informed consent was obtained

Guided and self-guided observations were maintained in approximately equal proportions. T1

included 53 guided and 47 self-guided records; T2 included 52 guided and 48 self-guided records.

Pearson chi-square tests indicated no statistically significant stage differences in visit mode, academic stage, gender, Hakka background, prior cultural knowledge, or visit duration. These tests do not create randomisation, but they provide a

useful check that the two cohorts were not obviously imbalanced on the measured baseline variables. The baseline comparisons are reported in Table 1

.Table 1. Baseline balance between the T1 and T2 visitor cohorts

Variable	χ^2	df	p	Cramér's V
Visit mode	0.020	1	.887	.010
Academic stage	2.597	2	.273	.114
Gender	0.181	1	.671	.030
Hakka background	2.436	2	.296	.110
Prior cultural knowledge	2.162	4	.706	.104
Visit duration	0.713	3	.870	.060

3.5 Statistical analysis

Cronbach's alpha was used to assess the internal consistency of the multi-item scales. Differences between the independent T1 and T2 cohorts were examined using Welch independent-samples t tests, with Cohen's d reported as the effect size. Statistical significance was set at $p < .05$.

4. Results

4.1 Reliability and descriptive structure

The three multi-item scores demonstrated high internal consistency. Cronbach's alpha was .876 for perceived route clarity, .889 for perceived cultural legibility, and .860 for overall evaluative response. These coefficients describe internal consistency in the present dataset but do not establish construct

validity.

4.2 Differences between T1 and T2 stages

All three components of visitor-reported route experience were higher at T2 than at T1. Route clarity increased from 3.10 to 4.06, visual continuity from 3.19 to 3.92, and cultural-node salience from 2.96 to 3.83. The corresponding standardised mean differences were large, with Cohen's d values of 1.63, 1.08, and 1.28, respectively. Cultural legibility increased from 3.24 to 4.06 ($d = 1.70$), and overall evaluative response increased from 3.26 to 3.81 ($d = 1.06$). Perceived authenticity rose slightly from 3.47 to 3.62, but the difference was not statistically significant ($p = .085$). The complete T1-T2 comparison, including Welch tests and effect sizes, is presented in Table 2.

Table 2. Differences in study outcomes between T1 and T2

Outcome	T1 M (SD)	T2 M (SD)	Welch t	p	Cohen's d
Perceived route clarity	3.10 (0.58)	4.06 (0.61)	11.51	< .001	1.63
Visual continuity	3.19 (0.73)	3.92 (0.61)	7.62	< .001	1.08
Cultural-node salience	2.96 (0.70)	3.83 (0.67)	9.03	< .001	1.28
Perceived authenticity	3.47 (0.63)	3.62 (0.60)	1.73	.085	0.24
Perceived cultural legibility	3.24 (0.49)	4.06 (0.48)	12.05	< .001	1.70
Overall evaluative response	3.26 (0.55)	3.81 (0.49)	7.50	< .001	1.06

5. Discussion

5.1 What the study demonstrates

The comparison shows that the T2 cohort reported clearer routes, stronger visual continuity, more salient cultural nodes, greater perceived cultural legibility, and a better overall evaluative response than the T1 cohort. The study does not establish individual change or a causal mechanism because different visitors were surveyed at the two stages. Its evidential value lies in the consistent pattern of stage differences across the prespecified visitor-reported outcomes.

The consistency of this pattern across the three route measures is important because the measures represent different aspects of the visit. Route clarity concerns the sequence of movement and the avoidance of unnecessary detours; visual continuity concerns whether the next destination can be anticipated; and cultural-node salience concerns whether culturally important features attract attention. Higher scores in all three areas suggest that the T2 condition was experienced not only as easier to navigate but also as more legible as an interpretive sequence. The questionnaire does not, however, identify which individual route

adjustment or interpretive cue produced each difference.

The higher cultural-legibility score at T2 is consistent with the proposition that spatial organisation can support visitors in connecting rooms, thresholds, ritual functions, and construction knowledge. This interpretation accords with environmental-legibility and wayfinding theory, which emphasises the organisation of environmental information into a coherent mental representation (Lynch, 1960; Passini, 1984). Nevertheless, cultural legibility was measured as visitors' own assessment immediately after the visit. The result therefore indicates stronger perceived understanding, not verified knowledge acquisition or retention.

The increase in overall evaluative response should be interpreted with the same restraint. The scale combines satisfaction with recommendation and revisit intentions, so the observed difference reflects a broad positive response rather than a single, narrowly defined outcome. Because route experience, perceived cultural legibility, and evaluation were recorded in the same questionnaire, their concurrent improvement is useful as a

descriptive pattern but does not demonstrate a causal sequence among them.

The non-significant change in perceived authenticity is an important conservation check. Route interventions should be evaluated for both intended benefits and potential adverse effects. Stable perceived authenticity would be encouraging in a real-world application, but a single self-report item cannot establish material or cultural integrity. Visitor perception should therefore be combined with conservation-expert review, photographic documentation, and a record of physical alterations. This is particularly important in heritage buildings, where improvements to accessibility or interpretation may unintentionally alter the spatial relationships that carry historical meaning.

The stage differences for route clarity and cultural legibility were large in standardised terms. These effect sizes should be interpreted cautiously because the study compares independent cohorts at a single site and relies primarily on self-reported outcomes. Large between-stage differences may reflect the circulation reorganisation, but they may also be influenced by unmeasured cohort composition, implementation conditions, expectations, or other contextual factors. The magnitude of the observed effects therefore strengthens the case for replication rather than strengthening causal certainty. Future studies should test whether similarly sized differences are reproduced across multiple sites, visitor groups, and intervention periods.

5.2 Design and Evaluation Implications

The findings suggest that circulation improvement in educational adaptive reuse should follow a principle of minimum and reversible intervention. Historic visual and ritual axes should be retained,

while route adjustments, lighting, material contrast, or subtle markers can be used to improve orientation without weakening the spatial hierarchy of halls, courtyards, lateral wings, and service spaces.

The separate route measures can also be used diagnostically. Low route-clarity scores would direct attention to the order and continuity of the visit; low visual-continuity scores would point to decision points and sight lines; and low cultural-node salience would indicate that important spaces or artefacts are being overlooked. Treating these dimensions separately is preferable to relying on a single overall route score because different weaknesses may require different, and potentially smaller, interventions.

The present findings do not justify wholesale spatial alteration. In a heritage setting, greater navigational ease is not automatically better if it removes historically meaningful thresholds or distinctions between formal and informal domains. Route changes should therefore be tested incrementally and evaluated alongside conservation evidence. Temporary markers, adjusted interpretive placement, or changes in visit sequence can be assessed before permanent physical work is considered. Interpretive information should also respond to spatial roles. Basic orientation and key cultural explanations are best placed at decision points and major cultural nodes, while more detailed interpretive content can be located in quieter spaces. This allows the density of information to follow the spatial rhythm of the building rather than relying on uniformly distributed signage.

5.3 Limitations

This study has three main limitations. First, its

single-case design and independent T1 and T2 cohorts limit external validity and prevent causal interpretation. Although the cohorts were broadly balanced on measured background variables, unobserved differences may remain. Second, visual continuity, cultural-node salience, and authenticity were measured with single items. Third, cultural legibility was self-reported rather than tested through an objective knowledge measure, and the overall evaluative outcome combines satisfaction with recommendation and revisit intentions.

6. Conclusion

This study compared visitor-reported outcomes before and after circulation reorganisation in the educational reuse of a Hakka weilong house. The T2 cohort reported higher route clarity, visual continuity, cultural-node salience, perceived cultural legibility, and overall evaluative response than the T1 cohort, while perceived authenticity did not show a substantive decline. These findings suggest that circulation reorganisation may improve both spatial orientation and visitors'

understanding of the cultural meaning embedded in the heritage environment. Route clarity, visual continuity, and cultural-node salience appear to represent complementary aspects of the visitor experience. Clearer routes can support a more coherent visit sequence, visual continuity can help visitors anticipate the next destination, and salient cultural nodes can draw attention to spaces and features with important cultural meaning. Together, these elements may strengthen perceived cultural legibility and help visitors better understand spatial hierarchy, principal room functions, and cultural relationships. The relatively stable perception of authenticity is also important, as it suggests that improved circulation and interpretation do not necessarily reduce the perceived historical atmosphere. Future research should combine visitor-reported outcomes with objective spatial analysis, behavioural observation, and learning measures.

References

- Arfa, F., Zijlstra, H., Lubelli, B., & Quist, W. (2022a). Adaptive reuse of heritage buildings: From a literature review to a model of practice. *The Historic Environment: Policy & Practice*, 13(2), 148-170. <https://doi.org/10.1080/17567505.2022.2058551>
- Arfa, F. H., Lubelli, B., Zijlstra, H., & Quist, W. (2022b). Criteria of effectiveness and related aspects in adaptive reuse projects of heritage buildings. *Sustainability*, 14(3), 1251. <https://doi.org/10.3390/su14031251>
- Bullen, P. A., & Love, P. E. D. (2011). Adaptive reuse of heritage buildings. *Structural Survey*, 29(5), 411-421. <https://doi.org/10.1108/02630801111182439>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334. <https://doi.org/10.1007/BF02310555>
- Douglas, J. (2006). *Building adaptation* (2nd ed.). Butterworth-Heinemann.
- Hu, L., & Yang, T. (2023). Landed and rooted: A comparative study of traditional Hakka dwellings, Tulous and Weilong Houses, based on the methodology of space syntax. *Buildings*, 13(10), 2644. <https://doi.org/10.3390/buildings13102644>

- Lan, K., Buranaut, I., Liang, Y., & Hsu, W. L. (2026). Development and application of a sustainable post-occupancy evaluation model for the regeneration of non-designated historic buildings. *Buildings*, 16(6), 1192. <https://doi.org/10.3390/buildings16061192>
- Langston, C., Wong, F. K. W., Hui, E. C. M., & Shen, L. Y. (2008). Strategic assessment of building adaptive reuse opportunities in Hong Kong. *Building and Environment*, 43(10), 1709-1718. <https://doi.org/10.1016/j.buildenv.2007.10.017>
- Leaman, A., Stevenson, F., & Bordass, B. (2010). Building evaluation: Practice and principles. *Building Research & Information*, 38(5), 564-577. <https://doi.org/10.1080/09613218.2010.495217>
- Li, W., Gao, X., Du, Z., Chen, S., & Zhao, M. (2023). The correlation between the architectural and cultural origins of the academies and the ancestral halls in Guangdong, China, from the perspective of kinship politics. *Journal of Asian Architecture and Building Engineering*, 23(5), 1536-1549. <https://doi.org/10.1080/13467581.2023.2278451>
- Li, P., Froese, T. M., & Brager, G. (2018). Post-occupancy evaluation: State-of-the-art analysis and state-of-the-practice review. *Building and Environment*, 133, 187-202. <https://doi.org/10.1016/j.buildenv.2018.02.024>
- Liang, R., Hota, G., Lei, Y., Li, Y., Stanislawski, D., & Jiang, Y. (2013). Nondestructive evaluation of historic Hakka rammed earth structures. *Sustainability*, 5(1), 298-315. <https://doi.org/10.3390/su5010298>
- Lynch, K. (1960). *The image of the city*. MIT Press.
- Nubani, L., Puryear, A., & Kellom, K. (2018). Measuring the effect of visual exposure and saliency of museum exhibits on visitors' level of contact and engagement. *Behavioral Sciences*, 8(11), 100. <https://doi.org/10.3390/bs8110100>
- O'Neill, M. J. (1991). Effects of signage and floor plan configuration on wayfinding accuracy. *Environment and Behavior*, 23(5), 553-574. <https://doi.org/10.1177/0013916591235002>
- Passini, R. (1984). *Wayfinding in architecture*. Van Nostrand Reinhold.
- Plevoets, B., & Van Cleempoel, K. (2019). *Adaptive reuse of the built heritage: Concepts and cases of an emerging discipline*. Routledge.
- Preiser, W. F. E., Rabinowitz, H. Z., & White, E. T. (1988). *Post-occupancy evaluation*. Van Nostrand Reinhold.
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.
- Shiple, R., Utz, S., & Parsons, M. (2006). Does adaptive reuse pay? A study of the business of building renovation in Ontario, Canada. *International Journal of Heritage Studies*, 12(6), 505-520. <https://doi.org/10.1080/13527250600940181>
- Weisman, J. (1981). Evaluating architectural legibility: Way-finding in the built environment. *Environment and Behavior*, 13(2), 189-204. <https://doi.org/10.1177/0013916581132004>
- Wineman, J. D., & Peponis, J. (2010). Constructing spatial meaning: Spatial affordances in museum design. *Environment and Behavior*, 42(1), 86-109. <https://doi.org/10.1177/0013916509335534>

Yung, E. H. K., & Chan, E. H. W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, 36(3), 352-361. <https://doi.org/10.1016/j.habitatint.2011.11.001>

Zhang, Q., Md Ali, Z., & Zainal Abidin, N. (2025). Sustainable adaptive reuse of historic buildings: Development of a framework from systematic review. *npj Heritage Science*, 13, 619. <https://doi.org/10.1038/s40494-025-02155-2>

Appendix A. Questionnaire Items

Response scale for A1-C4: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree. The revised English wording of all questionnaire items is provided in Table A1.

Table A1. Revised English wording of the questionnaire items

Item	Revised English wording
A1	During the visit, I could easily find the route from the entrance to the principal exhibition areas.
A2	I did not experience obvious disorientation or unnecessary detours during the visit.
A3	Key cultural nodes, such as the ancestral hall, plaques, and genealogy displays, were easy to notice.
A4	From courtyards, halls, and similar spaces, I could clearly identify the direction of the next destination.
A5	The order of the visit helped me understand the building progressively.
A6	The original and newly added facilities and displays did not damage the building's historical atmosphere.
B1	Through this visit, I understood the spatial logic of axial symmetry and the ordered relationship between inner and outer areas in the Hakka weilong house.
B2	I can identify at least one aspect of Hakka kinship culture or ritual order represented by the building.
B3	I understood the functions and meanings of principal spaces such as the upper hall, central hall, and lateral wings.
B4	After the visit, I gained new knowledge of Hakka construction wisdom, including site selection, materials, ventilation, and daylighting.
B5	The visit increased my interest in learning more about Hakka culture.
C1	Overall, I was satisfied with the spatial experience of this study visit.
C2	Overall, I was satisfied with the cultural knowledge gained during this visit.
C3	If I have the opportunity, I would recommend this study site to classmates or friends.
C4	If I have the opportunity, I would revisit the building for more in-depth learning.