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End-User Stakeholder Engagement in Refurbishment Design in Higher Education

Yuri Seki [1], Ayokunle Olubunmi Olanipekun [2,*] and Monty Sutrisna [3]

[1] Department of Construction Management, Curtin University, Perth, WA 6102, Australia
[2] School of Built Environment, University of Wolverhampton, Wolverhampton WV1 1LY, UK
[3] School of Built Environment, Massey University, Auckland 0632, New Zealand
* Correspondence: a.olanipekun@wlv.ac.uk

Abstract: The refurbishment of building facilities needs to incorporate end-user engagement to ensure refurbished building facilities outcomes that include user-responsive learning spaces and satisfy users' learning needs. However, existing refurbishment design process frameworks neglect to show the engagement process. A new framework for engaging end users in the refurbishment design of building facilities in higher education is presented. A qualitative research methodology was employed to obtain and analyse interview data from twenty-one design team stakeholders involved in two cases of refurbished building facilities in higher education institutions in Australia and New Zealand. The findings revealed four core themes which indicate the context and phases in the refurbishment design process where end-user engagement should be taken seriously. They are the higher education context, early design, user engagement in the design process and post-design phases. In addition, the findings revealed six specific strategies for end-user engagement in the refurbishment design of building facilities in higher education institutions. They are identifying stakeholder value systems, capturing end-user needs, communicating and integrating. Others are the setting of engagement boundaries and surveying of end users. This study modified the project heartbeat originally developed by Stanford University in 2010 for the refurbishment design process in a higher education context. The new framework bridges the gaps in the current literature between stakeholder theory and refurbishment design, and, by incorporating the refurbishment design processes, the framework can be employed in wider education and other project contexts to facilitate the balanced involvement of end users.

Keywords: building facilities; refurbishment design; higher education; stakeholder engagement; strategies

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1. Introduction

Building facilities are a core higher education infrastructure component for education activities such as teaching, learning and research [1]. As a result, they attract high investment. The Times Higher Education reported that some top urban and regional Australian universities expended an amount in excess of AUD 1.5 billion on single building facilities in 2019 [2]. Additionally, the Association of University Directors of Estates (AUDE) [3] reported no less than a GBP 3.5 billion expenditure on academic estates in UK universities in 2020 alone, despite the COVID-19 pandemic [3], while a top university was recorded to have invested NZD 1 billion on campus building facilities since 2011 in New Zealand [4]. Meanwhile, the pedagogical paradigm of higher education is changing, for instance, from one-way communication of wisdom from teachers to students to one that permits students to dialogue among themselves and with their teachers in the search for knowledge. According to Harris [5], as pedagogies change, so do the learning spaces. Meanwhile, the accumulated building facilities stock in many higher institutions has been constructed for at least two decades and has aged [6] and needs to change to correspond to pedagogical changes. Refurbishing aging building facilities helps to adapt them to the modern pedagogical needs of students and other users in higher institutions [7,8].

Critical to the refurbishment of building facilities in higher education is the need to involve end users because of the unique interconnection between the educator, the learner and the learning spaces. As stated by Harris [5], p. 135, "*learning space can no longer just be a structure with roof and walls*". End-user stakeholders, such as students, lecturers and administrators, do not just provide and/or learn in building facilities. Rather, and based on Alice and David Kolb's constructivist theory [9], an interconnection exists between learning and the building facilities environment, and it creates meaning for the educators and learners. Educators and learners have been recorded as deriving positive and negative emotions from building facilities while learning, and these contribute to their satisfaction [10–12]. To ensure that end users in higher institutions are involved and able to provide inputs about their learning needs and what satisfies them in general in the refurbishment design process of building facilities, Suschek-Berger et al. [13] suggested a "tailor-made" end-user engagement process. However, the existing process frameworks, which focus on the refurbishment of building facilities (Sanvido et al. [14]) and RIBA [15]) in higher education [16], neglect to show the engagement process. As a result, design team stakeholders are left with neither strategies nor guidelines for engaging end users and obtaining their inputs in the process of the refurbishment design of building facilities in higher institutions (see [17] and Wilson [12]). Problems, such as overlooking end users and hesitations and unwillingness to support project progress, continue to persist [18,19] in the refurbishment of building facilities in higher institutions [20]. This research aims to improve end-user engagement in the refurbishment design of building facilities in a higher education context by achieving the following objectives:

1. Determine the specific phases of end-user engagement in the refurbishment design process of building facilities in higher institutions;
2. Identify specific end-user engagement strategies adopted in higher education refurbishment projects.

The cross-pollination and integration of these two objectives within the specific context of higher education institutes are expected to bridge the gap in the current literature between stakeholder theory and refurbishment design to identify strategies for engaging end users in the different phases of the refurbishment design of building facilities in higher education. Ideally, end-user engagement should be set up in a systematic manner to ensure optimum information flow in decision making in the education context [20]. Therefore, it is expected that these strategies will become the guideline for end-user engagement in the future refurbishment design of building facilities in a higher education context.

1.1. Building Facilities Refurbishment in Higher Education

Building facilities provision has been a major response to the adoption of the modern pedagogical paradigm in higher education institutions. In contrast to the old pedagogical paradigm of traditional one-way communication of wisdom from teachers to students, the modern paradigm permits students to search for knowledge through dialogues with each other and their teachers [21]. The modern paradigm is more desirable among the current generational cohorts of students who are millennials (those born between years 1985 and 2000) and Generation Z (those born after the year 2000), characterised as an optimistic, independent and individualistic generation that places more emphasis on family and friends [8]. Building facilities that integrate the physical, virtual and social learning environments facilitate interaction and individual privacy in the learning process for these cohorts of students [21]. As a result, students rate campus facilities very highly and consider them in their preference for one higher education institution over another [8]. In addition, studies have shown that adequate, well-conditioned and maintained building facilities enhance the academic achievements of students in higher institutions [22,23].

Consequently, leaders in higher education institutions (as well as facilities personnel) must continuously modify building facilities' construction to support student learning needs, including increasing average space per student. Accordingly, this requires significant financial investments, which have been challenging to obtain due to declining and/or

flattened tuition fees and reduced government support [24]. Additionally, currently, the COVID-19 pandemic has led to uncertainty in student enrolments. In times past, when student enrolments may have been increasing, the sector did not typically factor in the increase into the enhancement of building facilities [7]. Reports from the US higher education sector reveal that the historical approach has produced two eras of building facilities stock; the first one includes those buildings constructed from 1950 to 1975, and the second one includes those constructed from 2000 to the present day [7,25]. With more than twenty years of construction, the building facilities constructed in both eras have aged and, thereby, are subjected to a high risk of facilities failure which makes them unfit to support modern learning [6,7]. Interestingly, the two eras mentioned in the reports above represent the largest concentration of building facilities construction in the education sector in the US (40% and 27%, respectively). Elsewhere, in the UK, the statistics are similar, revealing that 40% of higher education building facilities stock was constructed between 1960 and 1980 [26]. Under these circumstances, refurbishing aging building facilities and adapting them to "changing and new teaching methods" is more practicable (or feasible) than constructing new building facilities given the declining financial investments. According to the McDonald [8] and the Gordian Report [7], routine updates, renovations and improvements can be implemented to keep building facilities up to date, prevent facilities failure and attract prospective students.

1.2. Previous Studies on Building Refurbishment in Higher Education

Building facilities refurbishment is increasingly embraced in the higher education sector to adapt the existing building stock in many European countries, such as the UK and Italy [27,28], and others, such as the USA and Malaysia [29,30]. Building facilities refurbishment can be implemented to adapt the aging stock for new or updated use by employing the right design process [6,31]. The design process of the refurbishment of building facilities involves the design team stakeholders that execute the refurbishment and the end-user stakeholders [32] who directly and frequently interact with the project outcomes of the refurbishment [33]. Within the context of higher education, the design team may comprise the institution authorities and facilities personnel, project designers, engineers and contractors and consultants who must focus on the needs, desires and requirements of end users [8] to provide a functional and well-accepted concept [32]. In the same context, the end users are mainly students, but also the lecturers and professional administrators who deliver learning experiences to the students. Essentially, building facilities refurbishment centres mainly on satisfying pedagogical needs [34–37]. The design team must consider user engagement to ensure end-user value, ownership of design and design satisfaction [38,39]. This is more crucial in education building facilities where users also remain in place during refurbishment. The design team needs to embrace user participation by effectively communicating and achieving buy-in from the users both during the process of intervention and after the construction work is completed [20].

According to Kpamma et al. [39], despite the significance of end-user involvement, the biggest challenge is identifying the best engagement strategy to ensure effective user participation in the design. This should be captured in the building facilities refurbishment design process framework. An often-cited design process framework is the Plan of Work by the Royal Institute of British Architects (RIBA). This framework was developed as a general guide for construction works, including both new builds and refurbishments [40]. Though it provides a relevant overview of the entire project, inclusive of design processes, Ali et al. [41] criticised its non-suitability for refurbishments, in line with Ali [42]'s opinion that design processes in building refurbishments are different from those of new-build projects. For instance, the former often involve more temporary works which are difficult to reach in existing buildings [41,42]. In attempts to differentiate the design process in refurbishments and new-build projects, a comparison is made between several design frameworks in Figure 1. The design phase diagrams from Sanvido et al. [14] and RIBA [15] are for general building projects, while the framework by Ali et al. [41] was specifically

tailored for refurbishments. A noticeable difference within the design process diagrams is the lack of initial project requirement assessment in the refurbishment process proposed by Ali et al. [41]. The consequence is that stakeholder needs may be left out of the project design without project requirement assessment.

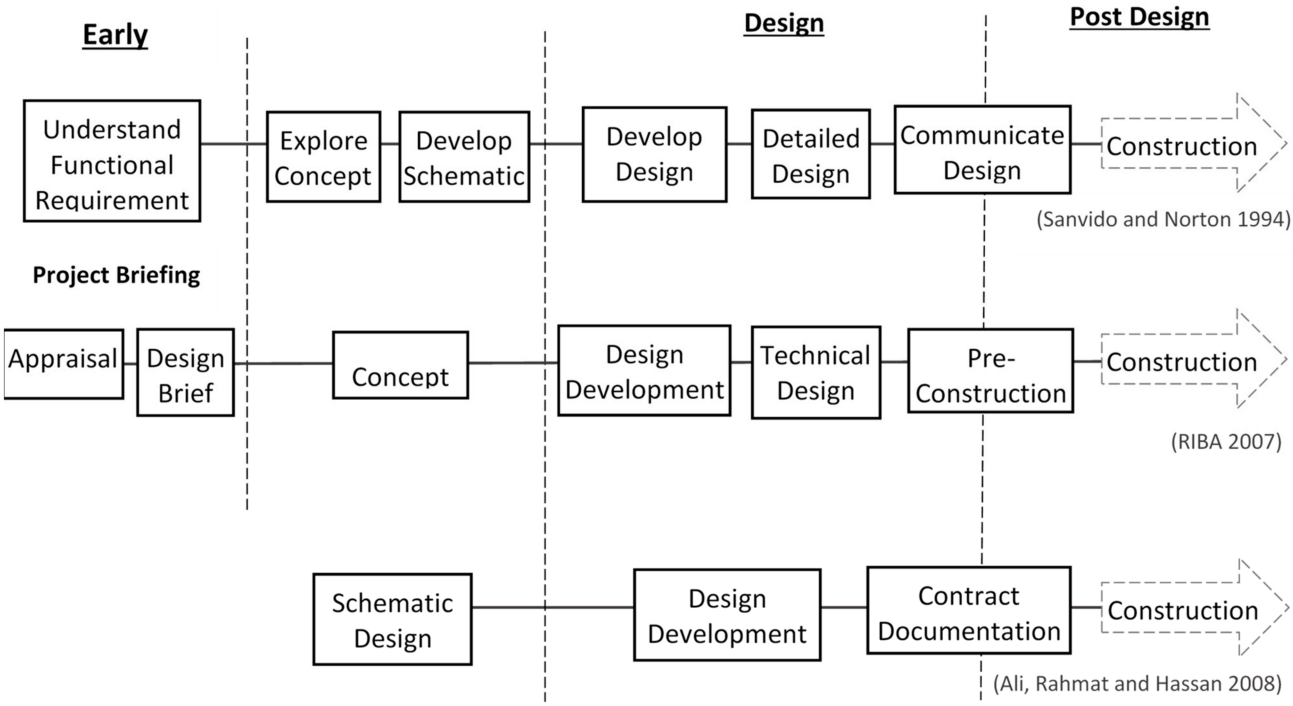

Figure 1. Comparison of new-build and refurbishment design phases. Reprinted/adapted with permission from Refs. [14,15,41].

Meanwhile, a Stanford University paper [43] is currently the only paper that discusses the building facilities refurbishment design process in a higher education context in detail. It is called the 'The Project Delivery Process Model' and introduced the concept of the "project heartbeat", capturing the initial project briefing (Figures 2 and 3), which is critical to any construction process [44]. Therefore, the 'project heartbeat' model is like the design processes proposed by the Sanvido et al. [14], RIBA [15] and RIBA [45] frameworks but dissimilar to Ali et al. [41]'s framework. In addition to project briefing, the other stages in the framework are feasibility, programming, schematic designing design development and others [43]. For all the other frameworks, programming is lacking, thereby reinforcing the uniqueness of Stanford University's [43] 'project heartbeat' model in the higher education context. Optimal programming lessens disruption to building use during refurbishment [36,46]. Additionally, the 'project heartbeat' model established "approval and monetary getaways" to ensure that institutional stakeholders at Stanford University were continuously informed throughout the project. However, in line with concerns raised by Jamieson [17], Wilson [12] and Rahmat et al. [47], this model neglects to show the engagement process which should be occurring in parallel. Therefore, end-user engagement in building facilities refurbishment in higher education is less strategic, whereby the design team only gives "lip service" and does not necessarily engage with the end users to consider their views [20,48–50].

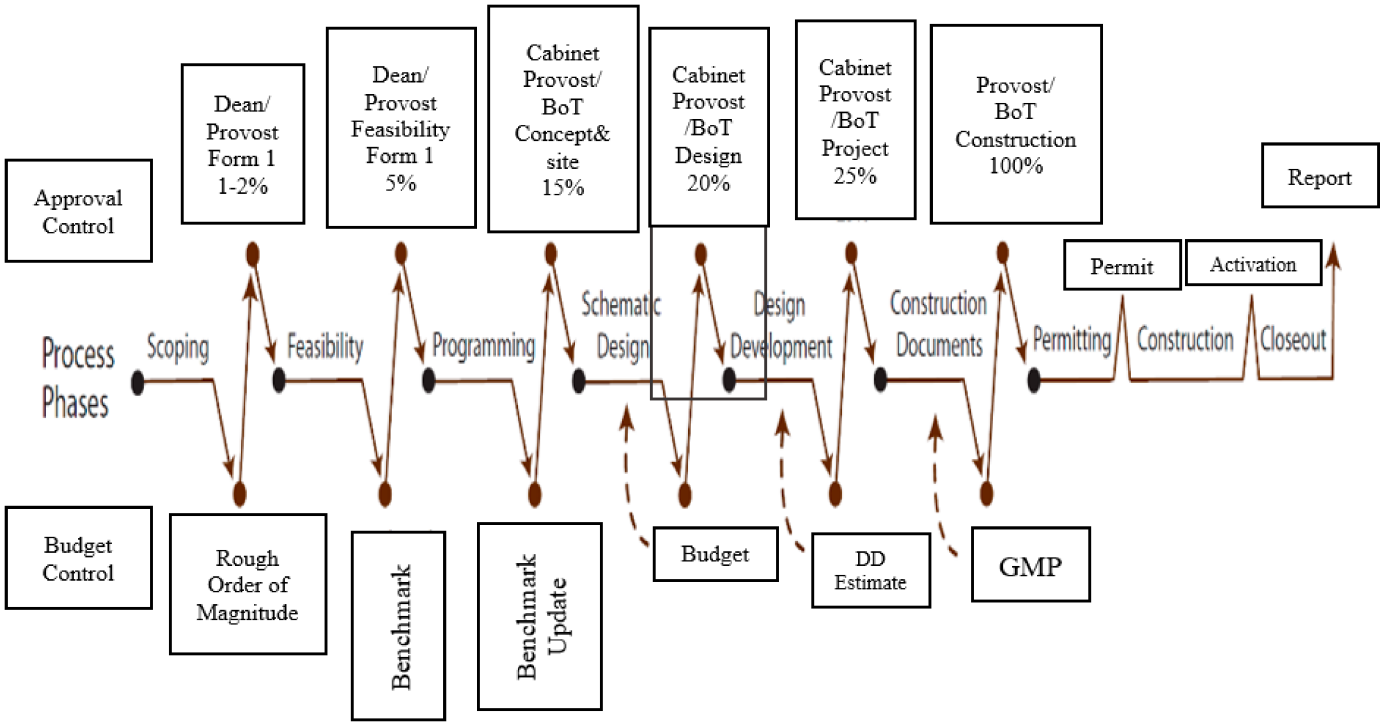

Figure 2. Higher Education Institute New Project Heartbeat (adapted from Standard University ([43])).

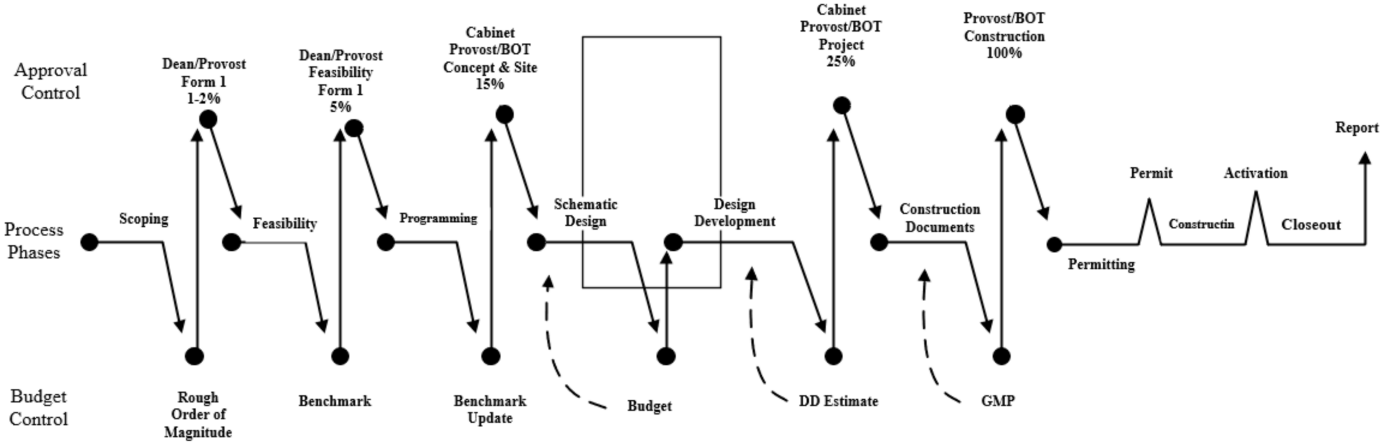

Figure 3. Higher Education Institute Refurbishment Project Heartbeat (adapted from Stanford University [43]).

As it is a seminal work in this domain, this study built on the 'The Project Delivery Process Model' by Stanford University [43] to identify specific strategies that design team stakeholders can employ for engaging end-user stakeholders during building facilities refurbishment in higher education.

2. Research Methodology

To explore end-user stakeholder engagement in the refurbishment design process, two refurbished building facilities in higher education were analysed and are described in this study. End-user engagement in building facilities refurbishment can be regarded as a contemporary case, as observed in the literature. Therefore, according to Creswell [51], the case study strategy was preferable for exploring the contemporary case of end-user engagement in building facilities refurbishment. This case is situated within the context of higher education environment, and investigating the case within its context was paramount for achieving the aim of study. The case study strategy was further preferred because it

permitted the cases to be studied in their actual context and uncovered the real issues in the process [52]. Yin [53] described the case study strategy as an empirical enquiry that firmly examines a contemporary subject in its real-world context. Subsequently, the two cases selected are described in the following paragraphs. The cases were selected from higher education institutions in Australian and New Zealand. Based on comparative analysis between the Australia Qualifications Framework (AQF) and New Zealand Qualifications Framework (NZQF), these countries were selected because of the strong alignment between the pedagogical approaches and learning spaces in Australia and New Zealand [54]. For instance, from their descriptions, both cases involved active stakeholder engagement between design and end-user stakeholders, and each of the projects was uniquely targeted to meet modern pedagogical requirements in Australia and New Zealand using refurbishment strategies. However, because of stronger incorporation of indigenous approaches in New Zealand than Australian higher education [55,56], more insights into end-user engagement in building facilities refurbishment could be obtained from both cases. As shown in Figure 4, the overall methodology comprised of data collection by interview, data analysis using a coding scheme consistent with the GTM approach to reveal the phases in the refurbishment design where end-user engagement should be taken seriously and strategies for end-user engagement in refurbishment design.

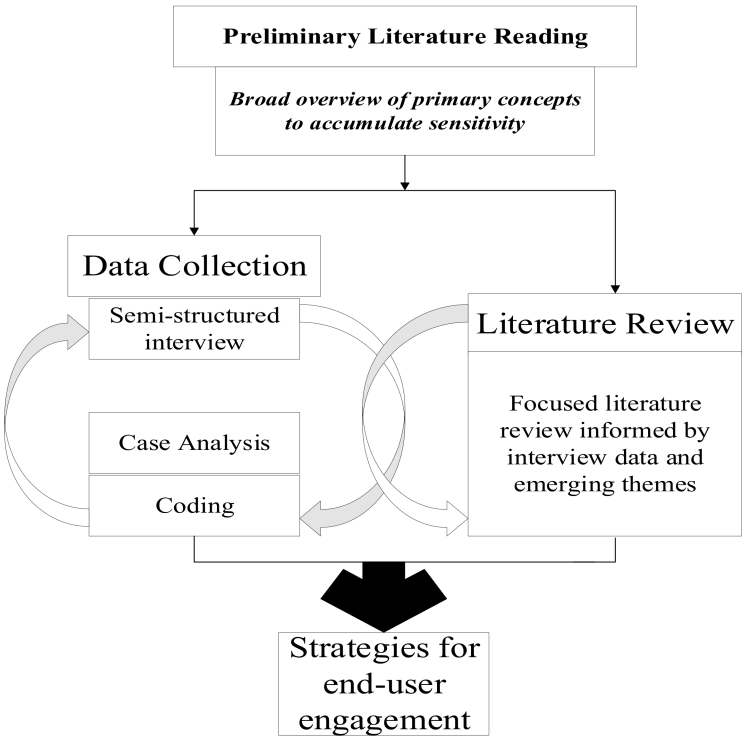

Figure 4. Research methodology flow diagram.

2.1. The Background and Description of Case Projects

The first case (Case 1) is a AUD 20 million building facility refurbishment project in a higher education institute in Western Australia. In this institute, building development activities for a period of two decades were governed by their masterplan—which sets precedents for the other institutes in the region as to how vintage building stocks can be reimagined and refurbished for the future. The project featured a four-storey building originally built in 1975. After the building refurbishment, it was opened for use in 2015. The initiation, planning and design of the refurbishment project coincided with the roll out of the masterplan, and this afforded the opportunity for the refurbishment to be a flagship project for benchmarking future building facilities refurbishment in the institute. Within the refurbished building facility, the teaching and learning (T&L) spaces are spread across

Level 1 and Level 2. The informal learning spaces are found on Level 1, where students are provided with access to a 24 h study laboratory. The specialised T&L spaces for one of the schools are situated on Level 2. The remaining spaces on both the levels are a mixture of general T&L spaces as well as group study rooms. The refurbished building facility houses school-specific academic and professional staff on Level 3 and Level 4. Moving out towards the wings of each level, where access is restricted to staff only, the space is laid out as a collaborative open office where both academic and professional staff work in an open environment without private offices (Haynes et al., 2011). This feature necessitated a high degree of end-user engagement during the design journey of the refurbishment to best incorporate the spatial environments which suited their pedagogical needs.

The second case (Case 2) is a refurbishment of an existing academic building at a university in New Zealand. The refurbishment was part of a NZD 120 million development plan to meet the growth in student numbers in the university. The scope of refurbishment was the extension of the gross floor size from 2484 m^2 gross to 4373 m^2, and it was completed at the end of 2019. The extension included five additional teaching spaces on the first floor and workspace to accommodate around one hundred and ten (110) staff and postgraduate students on the second floor. Because the refurbishment project was part of the university's current, ambitious development plan, it attracted stakeholder interest, including that of university leaders who called for investor partners to support the plan and the local council who granted consent for refurbishment. In addition, many staff and postgraduate students needed to relocate and occupy the refurbished building. Engaging them during the refurbishment design process was important to ensure satisfactory occupation.

2.2. Data Collection

The design team members (participants) involved in the refurbishment design process in both cases were interviewed using a semi-structured interview method to obtain qualitative data. For both cases, twenty-one participants were selected for interview using the snowballing technique. As shown in Table 1, these participants were labelled P_1–P_{21}. In Case 1, for instance, the first contact was with the Campus Planning Manager (P1). The snowballing technique was then used with the Planning Manager, where this participant assisted in recruiting further credible participants [57], as identified in Table 1. There are fifteen participants (P_1–P_{15}) listed. The initial group of participants included the primary stakeholders, such as the Project Managers (P_3 and P_5), architect (P_4) and end-user representatives (P_8 and P_{10}). The technique was employed in Case 2, starting with P_{21}, who assisted in recruiting the others shown in Table 1. There are six participants (P_{16}–P_{21}) listed. The interview of each of the participants in both cases lasted between forty-five minutes and one hour.

Table 1. Participant profile of case projects.

Participant Profile (Case 1 and Case 2)	
P_1	Campus Planning Manager
P_2	Faculty Project Officer
P_3	Internal Project Manager (first)
P_4	Lead Consultant/Architect (external)
P_5	Internal Project Manager (second)
P_6	Student
P_7	Campus Electrical Manager
P_8	Academic Staff
P_9	Campus Audio Visual Manager
P_{10}	Academic Staff

Table 1. *Cont.*

Participant Profile (Case 1 and Case 2)	
P_{11}	Student
P_{12}	Head of School
P_{13}	Sustainability Consultants $_{(external)}$
P_{14}	Student
P_{15}	Campus Mechanical Manager
P_{16}	Project Manager Designer—Consultant
P_{17}	Change Manager—Consultant
P_{18}	Architect—Consultant
P_{19}	Furniture—Internal
P_{20}	Internal (Project Coordinator)
P_{21}	Project Manager

Using the semi-structured interview method, the researcher was able to actively participate by interacting with the participants during the interview, and this helped in constructing meaningful interpretations of participant responses [58]. To achieve this, the semi-structured interviews comprised general questions which were open-ended [59]. This helped the researcher to maintain an extent of control whilst still providing the flexibility to explore emerging ideas that arose during the interviews. Each of the interview sessions was audio-recorded, and this helped the interviewer (researcher) to remain focused on the unfolding interview rather than on taking notes [57]. As these interviews were completed, the collected data informed the direction of the following research activities and associated participants. This concept is known as theoretical sampling in some methodologies, such as the grounded theory methodology (GTM), where the selection of subsequent study samples is also guided by the findings captured from the previous interviews [60,61]. Because of the theoretical sampling, the participation pool for this research grew to include technical stakeholders (P_7, P_9, P_{13}), external consultants (P_{15}) and students (P_6, P_{14}) in Case 1 only.

2.3. Data Analysis

After transcribing the interview data, the transcripts were sent back to each participant in both cases, providing them with the opportunity to review and give any comments. The interview data were analysed inductively with a coding scheme consistent with GTM style data analysis using NVivo software. It is to be noted that using the GTM style was aimed at developing holistic understanding (of end-user engagement in the design of higher education refurbishments) but not to develop a substantive theory. The coding analysis, particularly executed in the way described by GTM, helped in systematically interrogating the data by organising themes embedded in or emerging from the contextual data into codes/nodes. There were three levels of coding, the first being open coding. In the initial stage, the researcher maintained an open mind to capture as many of the emerging themes from the data in the NVivo software [60]. Subsequently, the researcher began to observe the similarities between the nodes and grouped them together in the software. The action assigned the open nodes to relevant parent nodes, whose emerging properties were captured in a memo. Selective coding was the final coding step where the parent nodes were, again, raised to a higher coding level which represented the significant core themes that were associated with the research aim.

2.4. Case Analysis

In Case 1 and Case 2, open coding of the interview data from the case study data resulted in 498 and 199 open codes, respectively. The iterative process of axial coding then resulted in the grouping of the open codes into 33 and 13 parent (axial) nodes, respectively.

The parent nodes in both cases were further analysed through selective coding and abstraction to the highest level represented by the four core themes: higher education context, early design, user engagement in design process and post design. The core themes indicate the phases in the refurbishment design process where end-user engagement should be taken seriously. Figure 5 provides an illustration of the coding process.

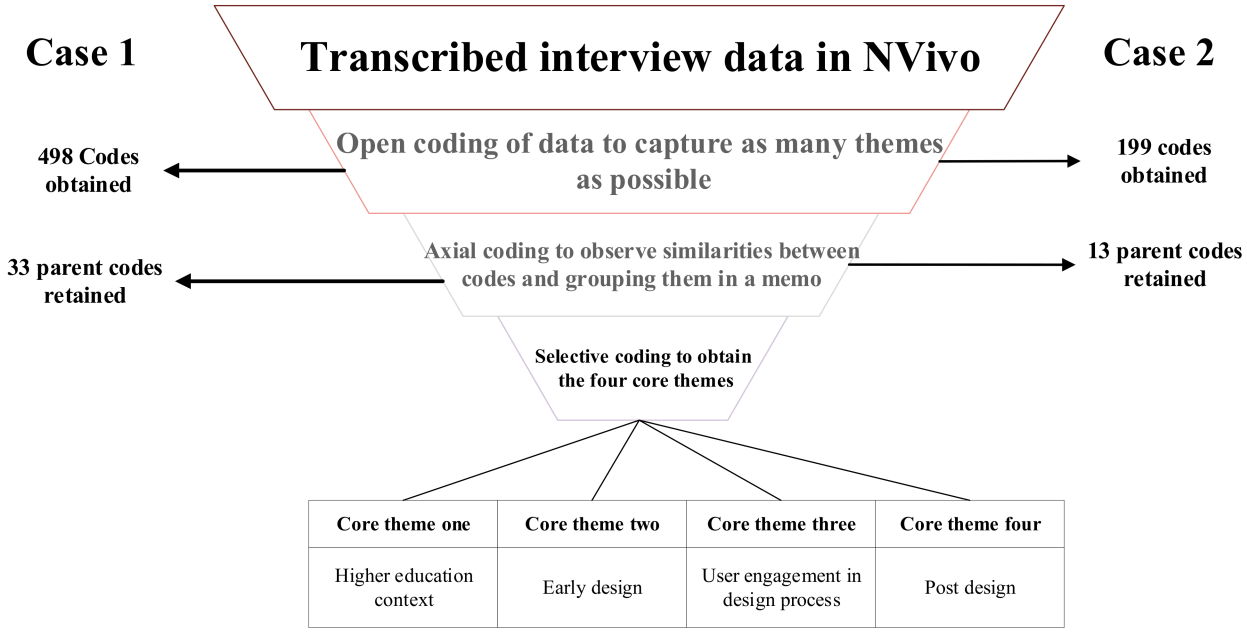

Figure 5. Illustration of the coding process leading to the core themes.

2.5. Core Themes of End-User Stakeholder Engagement in Building Facilities Refurbishment in Higher Education

2.5.1. Core Theme 1: Higher Education Context

This refers to the multi-faceted nature of the business of higher education institutes in this modern world. This translates to multiple-stakeholder involvement in the refurbishment design process. As mentioned previously, multiple stakeholders were involved across both cases and interviewed and are identified in Table 1. In Case 1, the stakeholders involved can be grouped into Faculty Project Officer, the institute, architect and end users, as shown in Figure 6. Similarly, stakeholders, comprising project coordinators, consultants and a change manager, were involved in Case 2. This grouping further demonstrates the stakeholder roles and responsibilities in the refurbishment project. It can be seen that end users are a single puzzle piece in the entire jigsaw of project stakeholders (Figure 6). Yet, (the project objectives must be acceptable to them to avoid conflict) they need to be satisfied with the project objectives. P_1, P_2, P_3, P_4, P_8, P_{10} and P_{12} reiterated the conflict between the end users (the school academic and professional staff) and the project owner (the institute) about the refurbishment of Case 1 to a collaborative, open office plan. In Case 2, P_{20} reiterated that end users were not happy about losing privacy and storage spaces due to the refurbishment to open office plan. According to P_4, P_7 and P_{10}, this necessitated stakeholder engagement between the end users and project owner, which was facilitated by the Faculty Project Officer (P_2), who was able to convene the varying worldviews among them (Case 1). P_7 and P_{10} also reported that engagement was supported by the architect (P_4), who listened to users and learnt the differences in their respective perspectives (Case 1). P_1 acknowledged the roles played by P_2 and P_4 as fundamental end-user engagement that shifted the existing awareness of stakeholders involved in the refurbishment design process (Case 1).

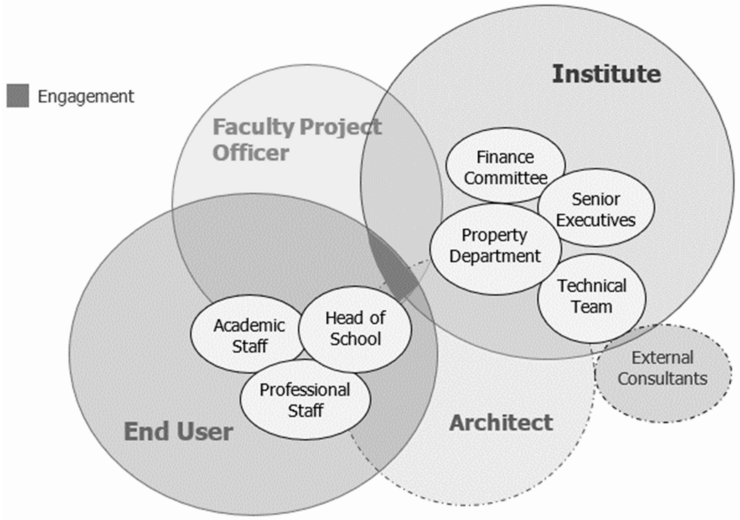

Figure 6. Intuitional context represented by project stakeholder systems.

2.5.2. Core Theme 2: Early Design Phase

The second core theme refers to the importance of the early design phase in the refurbishment design process. P_1 and P_2 (Case 1) and P_{16} (Case 2) mentioned that programming was an important refurbishment design activity in higher education facility development plans to ensure that building facilities and their functions are integrated across the entire campus. Prior to, or in parallel to, programming, is the identification of the building facilities' end-user stakeholders in the early design phase [62]. P_2, P_3, P_4 and P_5 in Case 1 mentioned that they identified the end-user stakeholders through conversations with the project steering committee. This is a form of snowballing technique, which, interestingly, was used to select interviewees in this study. In Case 2, despite being project participants, P_{19}, P_{20} and P_{21} used their positions as employees to directly contact some academic lecturers (end users) who were also employees in the university that funded the refurbishment project at the time. After identifying the end-user stakeholders, was the establishment of a line of communication with them. P_1, P_3, P_4, P_9 and P_{12} made clear that, during the early design phase, end-user engagement was kept at a high level and was only with a senior representative of the user group (i.e., Head of School in Case 1). In Case 2, monthly meetings with (high-level) school administrators were implemented to propose and affect changes to the project design (P_{20}). In Case 1, the early design phase terminated after the project was approved by the finance committee and formally became a funded project.

2.5.3. Core Theme 3: User Engagement in Design Process

The third core theme is the series of iterative and multidisciplinary activities of end-user engagement in the refurbishment design process. In Case 1, P_1, P_3 and P_4 stated that the refurbishment design process was like the general industry design practices shown in Figure 1. In the figure, the refurbishment design process is represented as 'design development', which captures the cyclical flow of activities within it but without specific consideration for end-user engagement. It reinforces the reality that not all users' expectations can be met, and it can lead to user disappointment, as revealed in P_8's expression in Case 1, "*while it is nice to give the staff their wish list, it is really sad when six months down the track [they say] 'no, no, no, you can't have that'. . .*". The expression also signifies the failure of the design team to set the boundaries by which users' expectations could be met. P_{10} (Case 1) and P_{18} (Case 2) observed part of the engagement problem to be the inability of the end users to comprehend the design models produced by the design team members. P_4 (Case 1) introduced basic drawings and photos, while P_{18} and P_{20} (Case 2) prototyped workstations as boundary objects to demonstrate the refurbishment vision to the end users to increase their engagement in the process. P_{12} had hoped for users' ownership of the design and a greater sense of belonging in Case 1. In Case 2, users selected their preferred

workspaces to enhance their ownership of the design (P_{20}). However, P_8 and P_{10} explicitly stated that the lack of engagement in the final stages of the design in Case 1 resulted in dissatisfaction with several design issues such as inadequate workplace storage, whiteboard configurations, classroom furniture and inappropriate storage spaces for the specialised classrooms. The design team may have rightly felt the need not to engage the end users, but, to demonstrate commitment to end-user involvement, P_1 and P_2 (Case 1) reiterated the substance of the continuous communication piece which informed the users appropriately.

2.5.4. Core Theme 4: Post-Design Phase

The fourth core theme captures the remaining project activities after the design is documented. In general, these activities include tendering, tender award, construction, commissioning, handover and the ongoing occupancy of the new, refurbished building. During construction, the executing team needs to consider whether they can carry out refurbishment works during active academic activities. According to Le et al. [36], this is important so that end users such as students and educators are not denied access to light and water utilities, for instance, if they are disrupted by refurbishment activities. Additionally, during active academic activities where end users remain in place, communicating with them to obtain their buy-in is crucial [20]. Notably, based on the fourth core theme, there was little engagement but more communication with end users in this phase. According to P_2, the end users were regularly presented with progress photos in monthly school meetings, and they were pinned up in the decant village where building users had relocated. The progress photos can be documented in line with institution's data management plan as reference for future refurbishments [36]. In addition, P_2 mentioned that a material board was placed in the decant village; all of which helped the design team to sustain dialogue with the end users. Furthermore, when Case 2 was carried out, P_{16}, P_{19} and P_{20} were in regular conversation with the users to track defaults in the refurbished project.

2.6. Strategies for End-User Engagement

After gaining conceptual sensitivity from the literature review, the case analysis produced insights into the phases in the refurbishment design where end-user engagement should be taken seriously, as well as specific strategies for end-user engagement. These strategies are reported in this section and are supported with a more focused review of the literature, consistent with the GTM style approach [63]. As shown in Appendix A, twenty-nine sources of literature published between 2001 and 2020 were used. The more focused literature study was divided into broad categories that corresponded with the key concepts that guided the undertaking of the research to this point (e.g., stakeholder engagement (e.g., [64], end-user choices and preferences [39] and design of learning environment in higher education (e.g., [65])). Additionally, the structure of the literature study, as presented in Appendix A, highlighted the area(s) of focus in the literature sources and their utilisation for discovering strategies 1–6, as follows.

2.6.1. Strategy 1: Identifying Stakeholder Value Systems

Consistent with the analysis of the first core theme, P_1, P_3, P_{15}, P_{16} and P_{17} (Case 1) and P_{17} (Case 2) confirmed that both higher education institutions are, by nature, a multi-faceted business context which operates under a complex network of organisational stakeholders which were translated into an array of project stakeholders in the refurbishment design process. Such a context (or institutional context) comprises cultural and social values [66,67] that are imbibed by the stakeholders, including end users [39]. Appropriate forms of engagement can be formed by consciously working with value systems which co-exist within the larger context to reach a collective understanding of the project [68]. Therefore, according to Kpamma et al. [39] and Eskerod and Vaagaasar [69], the differences in stakeholder value systems in the higher education context need to be explored (and identified) during the refurbishment design process as they are a barrier to engagement and communication between stakeholders, including the end users. P_{17}, who, as a "Change Manager", was

responsible for scoping and managing stakeholder expectations in Case 2, reiterated this point. Identifying the value systems helps to align the end-user values with other project stakeholder values in the refurbishment design process.

2.6.2. Strategy 2: Capturing End-User Needs

The importance of the early design phase that was analysed in the second theme reinforces the importance of the needs of relevant stakeholders, especially end users, and, according to Smith and Love [70] and Barrett [44] and Mok et al. [71], it must be carried out through the definition of the project brief. The needs assessment corresponds to the task of aligning the diverse worldviews and associated interests and perceptions within the institutional context (Strategy 1) to produce a balanced and relevant project brief. To undertake needs assessment requires the identification of end-user stakeholders. Within stakeholder theory, there is a plethora of standard stakeholder identification techniques, such as the Stakeholder Circle™ (Bourne and Walker [72] and Lehtinen and Aaltonen [64] and Bahadorestani et al. [62])). None of these techniques was used in either Case 1 or Case 2. Instead, the project stakeholders were identified in a non-standardised manner using the snowballing technique, which was consistent with previous studies in the higher education context carried out by Chigona et al. [48] and Storvang and Clarke [73]. Capturing end-user needs using standardised techniques is more effective; however, it must be appropriated in the project budget for it to be used by design team members [74].

2.6.3. Strategy 3: Communicating

As pointed out in Strategy 2, engaging end users to capture their needs is enhanced by communication between the designer, client and the end users [70]. According to Storvang and Clarke [73], critical to this communication is timing, which should be early in the design phase. It is belated, and sometimes counterproductive, to seek users' input later in the project when the flexibility in design and extent of their influence is limited [50,75,76]. In Case 1, the design team was involved in high-level engagement with the senior representative of the user group (i.e., Head of School). Additionally, in Case 2, high-level meetings with school administrators were carried out. According to Abuzeinab et al. [77], stakeholder engagement at the highest level is strategic and allows for information exchange in a simplistic form whilst considering operation-level input.

2.6.4. Strategy 4: Integrating

Based on the analysis of the third core theme, the refurbishment design process was found to be like the general industry design process because of its limited consideration of end-user engagement (Figure 1). As a result, the end users (in Case 1) experienced what could be termed (likened to) one-sided communication, whereby it was mainly the design team members that expressed themselves and made inputs into the design process [78]. In contrast to one-sided communication, is genuine dialogue between stakeholders (or engagement), and it is emphasised in this study. This can be achieved through integration of end users, which allows them to participate in genuine dialogue or two-way communication whereby they can respond to the design team inputs in the refurbishment design process [42,78,79]. For instance, users selected their preferred workspaces, which not only enhanced their ownership of the design but also afforded them the opportunity to dialogue with the design team members through feedback (P_{20}). Although it was limited, such dialogue ensured the interests of both stakeholder parties were accounted for, and decisions were made by considering them [49]. In corroboration, Kanyal [38] and Chigona et al. [48] also conveyed that genuine dialogue builds trust, acceptance, self-actualisation and sense of ownership for the parties involved.

2.6.5. Strategy 5: Setting Engagement Boundaries

Although integration of end users allow them to engage in genuine dialogue with design team stakeholders (Strategy 4), this does not give them complete influence over the

design process. In Case 2, the end users conceded their privacy and storage spaces due to the open office plan refurbishment (P_{20}). To prevent the end users feeling disappointed and frustrated if their expectations are not completely met, Fageha and Aibinu [76] and Johnson and Lomas [67] strongly endorse the need for well-defined engagement boundaries to clarify the extent to which users can influence design. Managing this mismatch between expectation and reality is crucial for effective engagement [80,81]. Its significance has been recognised by the International Association for Public Participation (IAP2), which explicitly highlighted the need to identify the 'negotiables' and 'non-negotiables' in their engagement framework [82]. Although there were no clear engagement boundaries for the end users in either Case 1 or Case 2, the design team members (e.g., P_4) showed commitment to their engagement, for instance, by using boundary objects and prototyping to improve their knowledge of design models and facilitate genuine dialogue between them in the process.

2.6.6. Strategy 6: Surveying of End-Users

The analysis of the fourth core theme revealed that, after the design documentation in the post-design phase, there was little engagement but more communication with the end users (in Cases 1 and 2) through the presentation of boundary objects, such as progress photos, at monthly meetings. The objects further enhanced the users' sense of ownership in the design [73], as they could slowly see their design transforming into something physical. An attempt at end-user engagement in the post-design phase was a pre-occupancy survey to obtain end users' inputs regarding the refurbishment design. However, analysis of Case 1 revealed that the survey was not ideal at this phase because the users had already relocated to the decant village, and the initial transition out of the building had already taken place (P_{13}). Upon completion, was the post-occupancy survey of users. P_{16}, P_{19} and P_{20} employed regular conversation to survey end users' experience of the refurbished project (Case 2) and track project defaults in the process. According to Oblinger [65], Egbu [83] and Emmons and Wilkinson [84], this practice is important for building facilities development in a higher education context, helping to identify the lessons learnt and taking away knowledge to support the continuous improvement of pedagogical practices and, in general, building practices.

3. Discussion

This analysis of the interview responses of stakeholders involved 21 respondents across two cases and revealed the context and the phases in the refurbishment design where end-user stakeholder engagement should be taken very seriously (see core themes 1–4). Furthermore, in addition to the conceptual sensitivity obtained from the literature, there was a continued review of literature (illustrated in Appendix A), in line with the GTM approach, which aided the discovery of strategies for end-user engagement in the refurbishment design of building facilities in higher education institutions. This section is focused on discussing the strategies for end-user engagement in different phases of the refurbishment design of building facilities in higher education, as illustrated in the framework in Figure 7. The framework alludes to co-designing principles, whereby user inputs are accommodated for inclusive product development. Smeenk et al. [85] developed research-led and a design-led co-designing dimensions. Designers observe and interview users in the former, while the users and the designers are actively involved to co-experience and co-create in the latter. The framework (Figure 7) is consistent with both dimensions. It is expected that these strategies will become the guideline for end-user engagement in the future refurbishment design of building facilities in higher education. The strategies for end-user engagement (Strategies 1–6) are applicable in the context (Strategy 1), and three phases (Strategies 2–6) are applicable in the refurbishment design of building facilities in higher education.

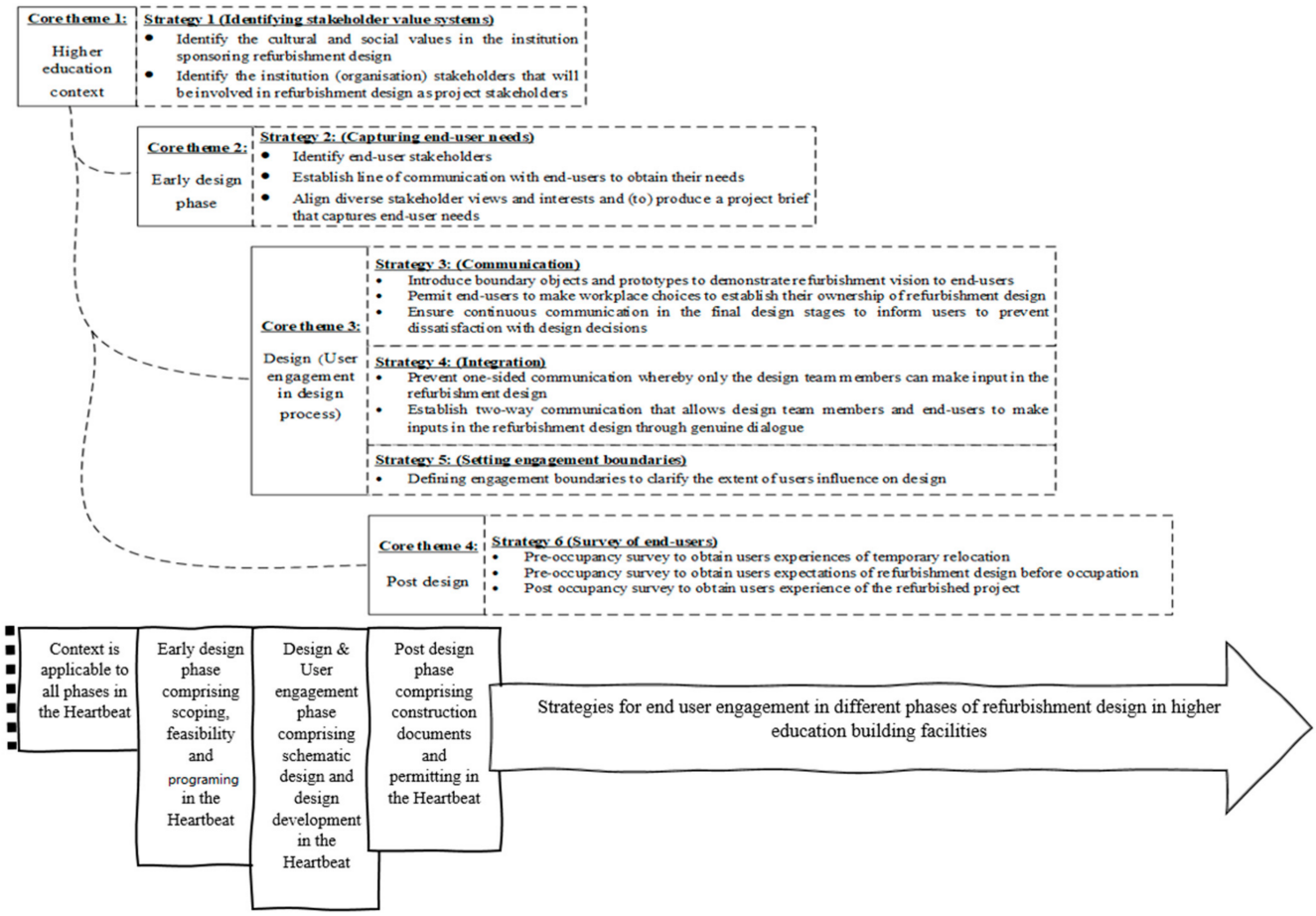

Figure 7. Strategies for end-user engagement.

The context refers to the higher institution environment, which operates under a network of complex organisation stakeholders, some of whom are recruited/commissioned in the refurbishment design of building facilities as project stakeholders. This suggests not single- but multiple-stakeholder participation in refurbishment design. Therefore, to effectively engage end users requires a joint effort or teamwork, and, as such, these stakeholders must work together. Personal values, such as friendliness, strong interpersonal relationships and collegiality, are value systems for undertaking successful projects [86]. Additionally, professional values, such as commitment to diversity and inclusivity, team creativity and shared understanding, are increasingly promoted value systems in higher institutions [87,88]. Therefore, the strategy that applies in this context is to recognise, identify and appreciate the value system (e.g., personal values, professional values, social and cultural values) that stakeholders need to either imbibe themselves and/or operate under to work together to engage end users in the refurbishment design of building facilities in higher education. In addition, the project stakeholders operating in different phases in the refurbishment design must be subject to this value system. Therefore, as illustrated using dotted, curved lines in Figure 7, recognising, identifying and appreciating the value system that applies in the phases of refurbishment design ensure effective end-user engagement. For instance, design team stakeholders who imbibe strong interpersonal relationships can achieve effective communication (Strategy 3) among themselves and with end users.

It is notable that the phases (e.g., the early design, design and post-design phases) in refurbishment design in Figure 7 correspond to the phases in some existing frameworks for general building designs (Sanvido et al. [14] and RIBA [45]) and refurbishment designs [41]. In the case analysis, these phases were identified for serious end-user engagement (see core themes 1–4). Additionally, by the application of the GTM approach, the strategies

for end-user engagement that apply in their respective phases were identified (Figure 7). Therefore, Ali et al. [41]'s framework, which was originally for refurbishment designs, incorporates the strategies for end-user engagement. For instance, Ali et al. [41]'s framework has been criticised for lacking initial project requirement assessment which, potentially, leaves out stakeholder needs in refurbishment design. Strategy 2—which is "capturing end-user needs"—can be incorporated in the early design phase in Ali's framework to remove this criticism. Additionally, by incorporating other strategies in their respective phases means that Ali's framework can also be adapted for end-user engagement in the refurbishment design process. In this case, it may require an adaptation to the context of higher education—which has been found in this study to be crucial to effective end-user engagement.

However, it is Stanford University's [43] framework that stands to benefit greatly from the strategies for end-user engagement in the different phases of refurbishment design. This framework was originally designed and structured for the refurbishment design of building facilities in the higher education context. This context was identified in the case analysis, and, through this, it reinforces the importance of context in the application of refurbishment design frameworks. Therefore, by its original design and structure, the Stanford University [43] framework is more relevant to refurbishment design than other frameworks such as those of Sanvido et al. [14] and RIBA [15] and Ali et al. [41] in the higher education context. However, like the other frameworks, what was missing is that the Stanford University [43] framework neglects to show the engagement process. Therefore, despite it being more relevant than others, it is not much of a guideline for end-user engagement in the refurbishment design process in a higher education context. This can be overcome by incorporating the strategies for end-user engagement into the different phases in refurbishment design in the Stanford University [43] framework. Given that this framework was originally suited for the higher education context, applying it directly after the incorporation of the strategies is possible. Therefore, unlike Ali's framework, an adaptation of the Stanford University [43] framework before application for, firstly, refurbishment design and, secondly, end-user engagement is not required. Recommendations for practical implementation of the strategies are stated in the next section.

4. Conclusions

It has been established that the refurbishment of existing and aging building facilities in higher education institutions needs to incorporate end-user engagement whereby the design team stakeholders employ the refurbishment design process framework as a guideline for engaging and obtaining inputs from end users to ensure that the refurbished building facilities' outcomes include user-responsive learning spaces and satisfy the learning needs of users. However, the existing process frameworks neglect to show the engagement process, and, as a result, design team stakeholders have no guideline for engaging with end users and obtaining their inputs in the process of the refurbishment design of building facilities in higher education institutions. Therefore, this study was aimed at improving end-user engagement in the refurbishment design of building facilities in higher education institutions. To achieve the aim, this study employed two case studies of refurbishment of building facilities in higher education institutions in Australia and New Zealand. Data from the case studies were obtained from interviews of project and end-user stakeholders. The data obtained were analysed using a coding style consistent with the GTM approach to reveal the phases in the refurbishment design when end-user stakeholder engagement should be taken very seriously. Additionally, as the data were analysed using elements of GTM approach, the findings unveiled specific strategies for end-user engagement in the refurbishment design of building facilities in higher education institutions. Based on the findings, this study concludes that the strategies for end-user engagement can be applied as a guideline in different phases in the refurbishment design of building facilities in higher education institutions.

As illustrated in Figure 7, applying the strategies as guidelines for end-user engagement should occur progressively according to the phases in the refurbishment design

of building facilities in higher education institutions. At the starting point, the design team stakeholders should be fully cognisant of the context, and, by being so, prioritise the personal and professional value system that supports team working in the higher institution where the refurbishment design is being undertaken. It is notable that the design team stakeholders are also engaged as consultants in traditional construction procurement settings where neither team working nor end-user stakeholder engagement is a priority, which makes end-user engagement more seamless for the design team stakeholders. Furthermore, as illustrated using dotted lines in Figure 7, being cognisant of the context and prioritising associated values is not a one-time task. It is a task that should be repeatedly emphasised since the design team stakeholders need to work together in all the phases of the refurbishment design process. Early in the design phase, the design team stakeholders can identify the specific end users, as well as establish line(s) of communication with them to produce a brief that capture their needs. During the main user engagement in the design process, design stakeholders should communicate with the end users and permit them to communicate their choices. The design team stakeholders should avoid one-sided communication. Instead, they should promote dialogue whereby end users can provide inputs into the refurbishment design within the limits of engagement boundaries. Finally, the design team stakeholders should endeavour to survey end users and obtain their experiences. This should include both pre- and post-occupancy surveys at different times in the refurbishment design process. Furthermore, the refurbishment phases in the framework are consistent with the RIBA [45] plan of work for new and refurbishment projects. In addition, the RIBA [45] plan of work can be used for the implementation of other types of building facility project in higher education, such as those which involve residential halls, offices, lecture halls, laboratories and sports halls. Therefore, the developed framework (Figure 7) can be used for engaging end users in the refurbishment of other building facility types in higher education.

The strategies for end-user engagement in the refurbishment design of building facilities in higher education institutions have been presented/illustrated as a guideline that is applicable in the different phases of refurbishment design process frameworks in this study. Therefore, this study combines theoretical knowledge in the areas of traditional refurbishment design, improvements to building facilities in higher institutions and stakeholder theory. By bridging these knowledge areas, this study has produced a strategic approach to end-user stakeholder engagement in the refurbishment design process in a higher education context. In terms of limitation, the end users in the analysed cases (or building facilities) were limited to the internal stakeholder category, comprising lecturers and students. Building facilities in higher institutions could also include sport and event-centre facilities where further needs and interests of external stakeholder categories may complement further understanding. Thus, in future research, the methodology in this study could also be used to develop strategies for engaging end users who are external stakeholders in the refurbishment of building facilities in a higher education context to expand knowledge in this specific matter.

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Appendix A

Table A1. Sources of literature for GTM approach.

Literature Sources	Areas of Focus	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
Bahadorestani et al. [62]	Planning for sustainable stakeholder engagement		Stating the sequence of identification of user stakeholders (core theme 2)				
Lehtinen and Aaltonen [64]	External stakeholder engagement in inter-organisational projects		Identifying stakeholder techniques for capturing needs				
Mok et al. [71]	Stakeholder complexity in large building projects		Emphasising project briefing to capture end-user needs				
Yang et al. [74]	Stakeholder management in megaprojects		Stating the economic condition for the use of standard techniques for stakeholder identification				
Kpamma et al. [39]	Decision system for user engagement	(1) Linking cultural and social values in higher education context for end users; (2) Stating the need for exploring the stakeholder value system in higher education context					
Butt et al. [75]	Project change stakeholder communication			Stating the disadvantage of late user engagement in refurbishment design			

Table A1. *Cont.*

Literature Sources	Areas of Focus	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
Eskerod et al. [80]	Stakeholder inclusiveness in project management					Stating the potential for mismatch between end users' expectation and reality in refurbishment design	
International Association for Public Participation (IAP2) [42]	Quality assurance for community and stakeholder engagement					Stating the need to identify "negotiables" and "non-negotiables" in stakeholder engagement	
Eskerod and Vaagaasar [69]	Stakeholder management and practices in projects	(1) Stating the need for exploring stakeholder value system in a higher education context					
Storvang and Clarke [73]	Stakeholder involvement in construction		Pointing out the lack of use of standard techniques for identifying project stakeholders	Stating the criticality of timing to communication			Stating the benefits of boundary objects to stakeholder engagement
Abuzeinab et al. [77]	Stakeholder engagement indicators			Stating the importance of strategic-level stakeholder engagement			
Kanyal [38]	Student participation in learning space development in higher institution				Stating the importance of two-way dialogue that leads to ownership of design by stakeholders		

Table A1. *Cont.*

Literature Sources	Areas of Focus	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
Fageha & Aibinu [76]	Project scope definition and stakeholder participation			Stating the disadvantage of late user engagement in refurbishment design		Reporting engagement boundaries for clarifying users' influence on design	
Burnside-Lowry [79]	Stakeholder communication				Describing two-sided communication that incorporates users' inputs		
Chigona et al. [48]	Stakeholder management in public access projects		Pointing out the lack of use of standard techniques for identifying project stakeholders		Stating the importance of two-way dialogue that leads to ownership of design by stakeholders		
Jeffery [81]	Roadmap to stakeholder engagement					Stating the potential for mismatch between end users' expectation and reality in refurbish-ment design	
Johnson and Lomas [67]	Design of learning spaces	Emphasising cultural and social values in higher education context				Reporting engagement boundaries for clarifying users' influence on design	
Bourne and Walker [72]	Stakeholder influence mapping		Identifying stakeholder techniques for capturing end-user needs				

Table A1. *Cont.*

Literature Sources	Areas of Focus	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
Foster and Jonker [49]	Stakeholder relationships and dialogues of engagement				Stating the importance of two-way dialogue that leads to genuine dialogue among stakeholders		
Oblinger [65]	Transition to learning spaces						Stating the importance of post-occupancy survey for refurbishment design in higher education
Kelly et al. [66]	Project briefing	Emphasising cultural and social values in higher education context					
Smith and Love [70]	Stakeholder management at project inception		Emphasising project briefing to capture end-user needs	Linking communication to end-user engagement			
Ivory [50]	User interactions in projects			Stating the disadvantage of late user engagement in refurbishment design			
Ali [42]	Managing refurbishment design process				Describing two-sided communication that incorporates users inputs		

Table A1. *Cont.*

Literature Sources	Areas of Focus	Strategy 1	Strategy 2	Strategy 3	Strategy 4	Strategy 5	Strategy 6
Egbu [83]	Knowledge management and post-project reviews						Stating the importance of post-occupancy survey for refurbishment design in higher education
Barret [44]	Project briefing		Emphasising project briefing to capture end-user needs				
Weisenfeld [68]	Perceptions and interests in engagement	Stating the positive impact of embracing cultural and social values in higher education					
Crane and Livesey [78]	Stakeholder communication and dialogue				Describing one-sided communication which excludes users inputs		
Emmons and Wilkinson [84]	Designing electronic classrooms						Stating the importance of post-occupancy survey for refurbishment design in higher education

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