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Experiential Learning in Agricultural Interpretation Centres: Architectural Strategies for Interactive Knowledge Environments

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Abstract — Agricultural Interpretation Centres serve to educate the public about farming and ecology through immersive experiences. However, their success depends heavily on architectural design that engages visitors. This study examines how architecture can be used as a medium of experiential learning in such centres. A literature review and case study analysis identify strategies linking spatial design to interactive knowledge. Key findings show that features like clear wayfinding, sensory-rich exhibits, and integration with the landscape can significantly enhance visitor engagement. For example, balanced natural light and natural materials improve comfort and focus, while tactile displays and environmental sounds strengthen understanding. The aim is to propose architectural strategies-covering site planning, flexible layout, accessibility, and sustainability-that make agricultural knowledge tangible. In conclusion, the study finds that architecture is not just a container for exhibits but an active teacher: thoughtful design can transform Agriculture Centres into compelling, multi-sensory learning environments.

Keywords— experiential learning; interpretation centre; interactive architecture; sensory design; agricultural education; landscape integration.

I. INTRODUCTION

1. Background of the Study

Agricultural education in public institutions has become crucial for raising awareness about sustainable farming and food systems. Interpretation centres - specialized museums or visitor centres focused on a single theme – translate complex topics into meaningful experiences. By design, heritage interpretation "reveals meanings and relationships through… original objects, by firsthand experience, and by illustrative media". In other words, these centres teach by engaging all the senses. Architecture plays a key role in this process. A well-designed building can itself be an educational tool: the "built environment… can be utilized as a learning opportunity and an applied source of knowledge". For instance, an interpretation centre at São Jorge (Azores) was described as the first point of contact to "explain the environmental values" of the landscape and to "awaken environmental education" in situ. In agricultural centres, a similar approach applies: spaces should physically connect visitors to farming. In Pamplona, Spain, a new farm interpretation centre was set amidst vegetable gardens and old farm buildings to anchor it in the land. By housing exhibits in greenhouse-like halls that flood with daylight, the architecture itself demonstrates agricultural processes.

Experiential learning theory underpins these ideas. In architecture education, experiential learning is defined as "the process of making meaning from direct experience". In other words, people learn best by doing and reflecting. Applied to interpretation centres, this suggests that visitors should actively participate rather than passively observe. For example, a centre might include hands-on activities or demonstration gardens to immerse visitors in farming practices, turning architecture into a kind of textbook. Research shows that these strategies work: clear spatial order with comfortable lighting and natural materials can "improve visual and tactile comfort" and reduce distractions, thereby enhancing learning. Similarly, a well-organized space helps visitors focus on the content. In sum, the background of this study is the overlap of agricultural outreach, interpretation theory, and experiential learning. There is growing recognition that architecture is not merely a backdrop but an active participant in education. This project investigates how design can harness that role in agricultural interpretation centres.

2. Research Problem

Despite the potential of architecture, many interpretation centres fail to engage the public when design is an afterthought. Experience suggests that a centre must be carefully planned around its theme in order to attract visitors; without this, even a new building is "rarely attractive". In the agricultural context, existing centres often treat exhibits as standalone artefacts, missing opportunities to use space, light, and movement to reinforce the story of farming. In other words, there is a gap in how architecture supports learning: if buildings are too static or disconnected from their environment, visitors may not connect

meaningfully with the subject. The research problem is to identify exactly where this gap lies. What architectural features are currently under-used in these centres? How can a building's form, materiality and layout be redesigned so that visitors learn experientially about agriculture as they move through it?

3. Aim of the Study

The aim of this study is to explore and propose architectural strategies that create engaging, interactive learning environments in agricultural interpretation centres.

4. Objectives of the Study

- Review principles of experiential learning and heritage interpretation in architectural literature.
- Examine how architectural space and sensory design influence visitor engagement.
- Analyze 2–3 case studies of interpretation or museum centres related to agriculture or ecology.
- Identify specific design strategies (site, circulation, exhibits, etc.) that promote interactive learning. Evaluate how these strategies address sustainability and accessibility concerns.

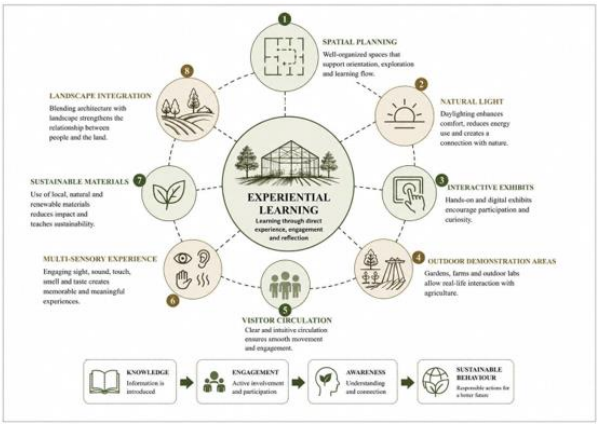
II. UNDERSTANDING EXPERIENTIAL LEARNING IN ARCHITECTURE

Experiential learning emphasizes "doing" as a path to knowledge. Kolb's model (1984) explains learning as a cycle of concrete experience, reflection, conceptualization, and experimentation. In an interpretation centre, architecture can provide the "concrete experience" and trigger reflection. Studies of educational architecture note that environments designed for interaction enhance learning: for example, spaces with clear organization and sensory variation support attention and knowledge retention. Salama and Holgate argue that in classroom and studio settings alike, the "built environment itself can be utilized as a learning opportunity". In practical terms, this means that architecture should not be a passive shell but a tool: scales, textures, and layouts become educational assets.

Interpretation centres apply these ideas to heritage and nature. They typically take a local theme and make it tangible. By definition, heritage interpretation seeks to "reveal meanings and relationships" of a site using original artifacts and first-hand experiences. Architecture facilitates this by shaping the visitor's journey. For instance, an interpretive building might guide visitors through a sequence of themed rooms or outdoor exhibits. Human perception is a key factor: research shows that features like lighting, color, and acoustic control can directly affect learning outcomes. Visually clear, spatially coherent environments reduce stress and improve focus. In an agricultural centre, this could translate into well-lit exhibit halls and calm "breakout" zones where hands-on activities occur.

Sensory architecture goes hand-in-hand with this approach. Multi-sensory design is known to enhance emotional engagement and memory. For example, a recent study of inclusive learning environments found that balanced daylighting, natural materials and access to green elements improved children's comfort and ability to concentrate. Translating to interpretation centres, designers might use abundant natural light, tactile display panels (e.g. samples of farm produce or soil), ambient farm sounds, or even scents of grass and earth to deepen immersion. Designers at an interpretation centre have recommended including interactive touchpoints such as replicas of crops or tools, and using environmental lighting and soundscapes to "transport visitors… into the natural environments" being interpreted. In this way, architecture becomes a vehicle for the senses, making abstract knowledge about agriculture concrete and memorable. Figure 1: Conceptual Diagram of Experiential Learning Elements in an Agricultural Interpretation Centre

Fig. 1 illustrates how spatial layout, materials, light, and exhibits work together to create an experiential learning environment. For example, engaging exhibition zones (green) connect to outdoor demonstration areas (yellow) via visually transparent circulation, allowing visitors to move between inside and outside seamlessly. Natural materials (shown in the pallette) and abundant daylight support comfort and attention. Interactive stations (blue) invite visitors to touch, taste or manipulate items, embodying the idea that learning occurs through "direct experience". This conceptual model will guide the analysis of case studies below.



III. CASE STUDIES

This section reviews three relevant projects where architecture serves an interpretive and educational role. Each case highlights different strategies for integrating architecture, landscape and learning:

Case study 1: Pamplona Agriculture Interpretation Centre (AldayJover, Spain). Architect: I. Alday & M. Jover. Location: Aranzadi Park (former river meadow), Pamplona, Spain. The design concept was to "blend into the place" by using familiar forms and sustainable technology. The building consists of three greenhouse-like halls in a single storey, connected by a central lobby. It is literally raised on a one-meter plinth to protect against flooding. The translucent polycarbonate roof and walls fill the interior with natural light, minimizing artificial lighting. Site planning is closely tied to agriculture: the centre is nestled among restored orchards and fields, with existing stone walls and a former farm stable carefully preserved and integrated into the plan. Materials were chosen to link to local agriculture: climbing plants grow on aluminum trellises outside, shading the facade, while interior display spaces retain rustic finishes. Sustainability is integral: roof vents work like a greenhouse to capture heat in winter

and release it in summer, and a shallow geothermal loop under nearby water supports passive heating and cooling. Visitors follow a linear route through the halls, from one agricultural theme to the next, with sight lines that constantly frame the outside fields. Lessons: This project shows how embedding a building in its landscape - and even using agricultural metaphors (greenhouse vents, raised floor) - can turn the entire centre into an educational tool. Its design "guarantees maximum comfort" for users while leaving "minimum environmental footprint", making sustainability both tangible and pedagogical.

Case study 2: Landwirtschaftliches Zentrum St. Gallen (LZS), Salez – Agricultural Training Centre (Andy Senn, Switzerland). Architect: Andy Senn (Andi Senn). Location: Salez, canton St. Gallen, Switzerland. This centre unifies several agriculture schools on a single campus. The concept was deliberately "low-tech," drawing on vernacular building craft to teach sustainability by example. The site is in a rural Alpine valley. Two wings form a right-angle courtyard with an open side facing the surrounding meadows. One wing houses classrooms and workshop labs (2 storeys), the other dormitories (3 storeys). The structural frame is all wood, with infill walls of clay brick - materials traditional to farming areas. An open perforated gallery shades the south facade, and windows along corridors allow daylight in while controlling glare. There is no forced air conditioning; instead, "cooling is low-tech," using natural cross-ventilation and stack effect to maintain comfort. Interior walls expose pipes and columns, emphasizing the building's honest construction and making HVAC visible. Visitors (students) move through functional zones (classrooms to farm sites). Sustainability features are overt teaching points: prefabricated timber construction with local materials, no automated systems. Interviews with users reported that this transparent, hands-on architecture "stimulates user awareness and responsibility" for the environment. Lessons: The Salez centre demonstrates that simple, traditional design can embody educational values. By letting visitors live and learn within a building that practices what it preaches – wood framing, daylight, and breeze – the architecture itself becomes part of the lesson.

Case Study 3: National Agricultural Museum of Korea (H Architecture, Korea). Architect: H Architecture, Inc. (Haehn Architecture). Location: Suwon (Gyeonggi province), South Korea. This large museum (completed 2022) is set on a former cluster of agricultural research fields within the city. The design

treats the building as a "park-like architecture" that blurs indoor/outdoor boundaries. A sculpted roof merges with the landscape, and much of the programme is buried: five exhibition halls are arranged along a central "spine" corridor that cuts into a gently sloping site. Visitors enter into a lobby that threads through all major functions (exhibit halls, education spaces, and a greenhouse).

Table 1: Comparative Analysis of the Three Case Studies

Criteria	Pamplona Agriculture Interpretation Centre (Spain)	Salez Agricultural Centre (Switzerland)	National Agricultural Museum (South Korea)
Architect	Aldaz Iever Arquitectos	Andy Senn Architekten	II Architecture
Completion Year	2013	2022	2022
Building Type	Agricultural Interpretation Centre	Agricultural Education & Training Centre	National Agricultural Museum
Planning Concept	Linear greenhouse-inspired layout	Courtyard-based campus	Central exhibition spine
Learning Strategy	Interactive interpretation with outdoor learning	Learning through architecture and practice	Immersive exhibitions with experiential learning
Spatial Organization	Linear sequence	Clustered courtyard arrangement	Centralized circulation with themed galleries
Landscape Integration	Demonstration farms integrated with building	Agricultural landscape integrated with campus	Museum integrated with gardens and greenhouse
Sustainability Features	Daylighting, natural ventilation, geothermal systems	Timber construction, passive design	Green roofs, daylighting, landscape integration
Primary Materials	Steel, glass, polycarbonate	Timber, brick, concrete	Concrete, steel, glass
Visitor Circulation	Linear guided route	Courtyard loop circulation	Central spine with radial access
Interactive Features	Demonstration farms, multimedia exhibits	Practical workshops, teaching farms	Digital exhibits, immersive galleries
Key Design Lesson	Learning through direct agricultural experience	Architecture as an educational tool	Integration of exhibitions with landscape for experiential learning

Surrounding the site are historic reservoirs, a mountain and test fields; these views are framed from interior galleries. Materials include concrete, steel and glass, chosen for durability on this scale. Notably, a large indoor greenhouse and adjacent outdoor learning plots allow live demonstrations of agriculture on-site. Lessons: At this scale, flexibility and narrative continuity were key: the hall clusters can operate separately or open up for large exhibitions, supporting diverse learning events. Although a formal museum rather than a small centre, it exemplifies how integrating topography and landscape - from reservoirs to farmland - can reinforce an agricultural theme. The central spine ensures intuitive wayfinding and connects the learning functions with the outdoors.

IV. ARCHITECTURAL DESIGN STRATEGIES

Based on the above and the literature, several architectural strategies emerge for supporting experiential learning:

Site Planning & Arrival Sequence: The building layout should respond to the agricultural setting. For example, in Pamplona the centre was located on an old meadow and aligned with existing orchards. Visitors approach through an open landscape, which immediately connects them to farming context. A deliberate arrival path (e.g. a long approach or sequence of thresholds) can prime visitors for discovery. The architecture can use axial views to orient visitors - for instance, sightlines that lead from the entrance toward fields or key exhibits. Careful orientation also helps passive climate control. In general, siting the building to capture prevailing breezes and daylight contributes to comfort and to the learning theme (for instance by highlighting solar paths).

Wayfinding & Circulation: Complex buildings require intuitive navigation. Straightforward hall layouts and clear corridors encourage exploration. One strategy is a central "spine" or corridor that links all major functions - as in the Korean museum, whose lobby corridor "penetrates into all different functions, guiding visitors" through exhibit halls and the greenhouse. This ensures visitors do not miss parts of the program. Good wayfinding also uses architectural cues: changes in ceiling height, floor patterns, or light can signal transitions between exhibit zones. In educational design, evidence shows that "effective wayfinding…reduces confusion, minimizes stress, and enhances the overall learning environment". Thus, signage and spatial organization should be user-friendly so attention can stay on the learning content.

Interactive Exhibition Spaces: Interior exhibition areas should invite active participation. Interpretation centres often include multimedia kiosks or hands-on displays. As [43] notes, interactive screens and audiovisual elements are "a very good resource for achieving an interactive and enjoyable experience" when tied to clear educational goals. For example, a centre might have touch-table maps of crop cycles or simulations of farm equipment. It is important that technology supports the narrative rather than distracts: exhibits should be integrated into the architectural story. Flexible modular displays allow reconfiguring space for workshops or events. Bright, spacious rooms with low display walls help families and groups move together and discuss exhibits in real time.

Outdoor Learning & Demonstration Areas: Learning extends beyond the building. Outdoor classrooms, farm plots or greenhouse labs can bring agriculture to life. For instance, Pamplona's centre physically included vegetable gardens and a refurbished stable among its exhibits. Such outdoor zones let visitors touch plants, operate simple machinery, or observe growing processes. The design should include amenities like covered outdoor spaces and non-slip paths. According to interpretation guidelines, centers benefit from "interpretive natural routes" and complementary activities in the surrounding landscape. Planning should allow guided walks through demonstration fields or sensory gardens. These outdoor routes reinforce the content by linking the indoor exhibits to the real environment.

Flexible Spaces & Landscape Integration: Spaces must serve multiple learning modes. A large hall might be used for lectures, an interactive game one day and community events another. Movable partitions or sliding walls can convert a gallery into a classroom. In the Korean museum concept, exhibition halls are designed to function either independently or combined into larger spaces. The architecture should also dissolve the boundary between indoors and outdoors. Landscape integration - such as framing views of fields or letting vines grow on facades - reminds visitors of the subject matter. For example, climbing plants on Pamplona's facade both moderate sun and physically tie the building to farming. Water features or symbolic landforms (like raised beds) can be both aesthetic and instructional. Ultimately, planning architecture and landscape together supports the centre's message of ecology.

Natural Light, Materiality & Climate: Daylighting and material choices greatly affect learning comfort. Studies find that balanced natural light "contributed to improved visual and tactile comfort" and reduced distraction. Therefore, rooflights, clerestories or translucent panels are valuable - as in Pamplona, whose polycarbonate roof harvests sunlight through much of the day. Materials can be chosen for sensory qualities and sustainability. Wood, clay, brick and stone not only cue traditional agriculture (barn wood, earth walls) but also feel warm and less institutional. Salez's use of timber structure and clay infill, and São Jorge's use of native basalt and wood trim, both reinforce connection to place. Climate-responsive design is critical: passive ventilation, thermal mass, and shading should be visible parts of the building's story. For example, Pamplona's greenhouse vents accumulate heat in winter and open for summer cooling. In all cases, making these strategies legible (exposed ducts, louvers, etc.) educates visitors about sustainability by example.

Climate-Responsive Design & Sustainability: An experiential centre should teach environmental lessons. Energy-efficient architecture (solar panels, rainwater reuse, geothermal loops) can be showcased. The Pamplona centre uses a shallow geothermal system under a river channel to stabilize temperatures. Salez's entire design is "low-tech" (no automated systems) to demonstrate that simple solutions work, which "can stimulate user awareness and responsibility". Green roofs, permeable paving, and native landscaping are further examples. All such features not only reduce operating cost but serve as live teaching tools, illustrating sustainable farming parallels (e.g. recycling water like irrigation). Whenever possible, materials with recycled content or local sourcing should be used, and their provenance explained in signage or tours.

Universal Accessibility: To be truly educational, centres must be inclusive. Universal Design principles state that environments should be usable by all people "regardless of age, size, ability or disability". This means providing ramps or elevators alongside stairs, tactile guide strips, large-text labels and audio tours for the visually or hearing-impaired, and ergonomic interactive stations. Clear sightlines and acoustical treatment help visitors with sensory sensitivities. The goal is that no group feels excluded. By embedding accessibility into the layout (for example placing exhibits at comfortable heights for all visitors), the architecture demonstrates social responsibility as part of its educational mission.

Multi-Sensory Experience Design: Finally, designing for all the senses is key to memorability. While many centres focus on visual displays, incorporating sound, smell and touch makes learning more vivid. For example, ambient farm sounds (barn animals, machinery) can play in background, or stations where visitors feel different soil or crop textures. Interpretation designers suggest adding small "touch-and-feel" exhibits (e.g. seeds, leaves) and evocative sounds or smells from the countryside. Audio guides or immersive theater spaces can narrate farming stories. Lighting design also contributes: warm,

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variable light can set mood and direct focus. Research shows that environments offering "calming zones" and controlled sensory stimulation help regulate attention and emotions. In sum, architects should choreograph a multi-sensory journey - every element from ceiling height to material texture to ambient scent - so that visitors absorb agricultural knowledge not only intellectually but with their whole bodies.

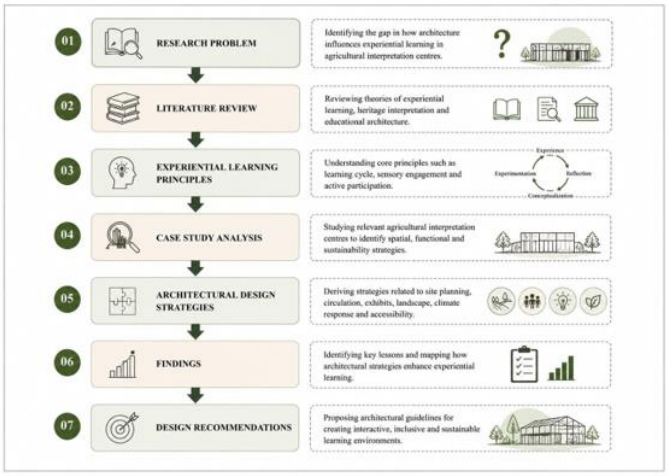

Figure 2: Research Framework

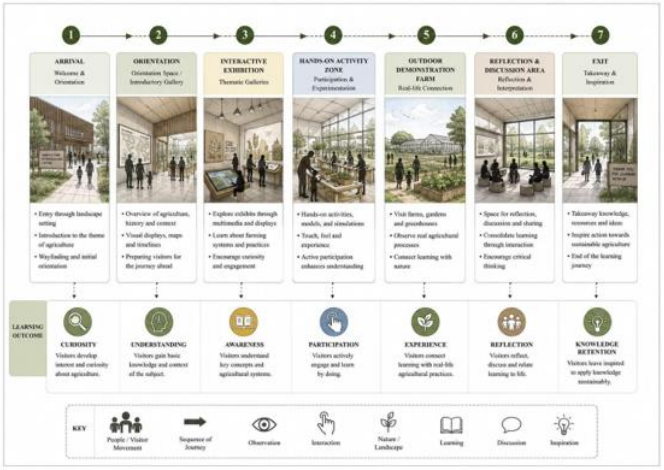

Figure 3: Visitor Journey Diagram

Figure 4: Architectural Design Strategies Infographic

V. CONCLUSION

This study finds that architecture can profoundly shape experiential learning in Agricultural Interpretation Centres. Major findings include that contextual integration (building in farmland, framing views of crops) and sensorial engagement (light, material, sound) together make the subject matter concrete. Centres should not isolate exhibits in neutral boxes; instead, spatial sequences and exhibit placement should tell a story that visitors physically move through. Features like flexible exhibit halls, outdoor demonstration plots, and accessible design ensure that learning is active, inclusive and enduring. Importantly, sustainability is not just an add-on but part of the curriculum: when a building's energy systems and materials embody eco-logic, visitors internalize those lessons by observation.

Architecturally, the implications are clear: designers of agricultural centres must collaborate closely with educators to treat every architectural decision as pedagogical. The strategies outlined here (see Section 4) provide a starting framework for such designs. By contrast to more passive museum architecture, these centres require an interdisciplinary approach uniting landscape, architecture and exhibit design. Future research could test these strategies with user studies or develop metrics for learning outcomes in built spaces. The goal is to continue refining how buildings can teach by example, so that

Agricultural Interpretation Centres become fully interactive knowledge environments that inspire stewardship of the land.

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