



HOW YOUNG ARCHITECTS HANDLE CIRCULAR ECONOMY

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Abstract : In this research we have focused on how young architects understand and deal with the idea of the circular economy through retrofitting methods. Retrofitting means making old buildings stronger, especially to resist earthquakes, by improving their strength, flexibility, and ability to carry loads, without changing their shape much. It is also a cost-saving method compared to building new structures, using fewer materials and giving similar performance.

In this research, different retrofitting techniques were discussed, such as strengthening columns, beams, walls, foundations, and joints. Non-structural parts like partitions, ceilings, furniture, and utilities were also considered. Retrofitting work is usually divided into three stages: assessment and analysis, design and techniques, and finally construction work. Some methods include using iron wires, adding corner columns, using wire mesh, fixing cracks with special cement, and improving foundations with underground beams and piles.

In this study, we made a table (or matrix) of 15 important retrofitting areas. For each one, we checked what architects need to know, what they already know, and what skills they need to learn. Based on this, we created 40 simple questions (yes/no and interest-based) and asked them to final-year students at Sigma College of Architecture.

We grouped their answers into four parts:

1. **Capacity** – what they already know
2. **Interest** – how curious or excited they are to learn more
3. **Value** – how important they think retrofitting is
4. **Explore** – how ready they are to use it in real life

After analyzing the results, it was found that while students have some basic knowledge about retrofitting, they still need more technical understanding, especially when linking retrofitting with the idea of the circular economy. This research shows that there is a strong need to include more retrofitting knowledge and training in architectural education, so that young architects are better prepared to handle future challenges in making old buildings more sustainable and safe.

IndexTerms - Circular Economy, Retrofitting, Architecture Students, Sustainability, Skill Development, Survey, Reuse, Old Buildings.

I. INTRODUCTION

Our world is facing big environmental problems. Construction work uses a lot of natural resources and creates waste and pollution. To reduce these problems, the circular economy gives us a new way to think. It tells us to reuse and recycle as much as possible. Instead of destroying old buildings, we should find smart ways to improve them. This is where retrofitting comes in.

Retrofitting means making old buildings stronger and more useful without destroying them. It helps us save materials, money, time, and history. It also helps reduce construction waste. This is very important in cities where land is limited and many buildings are getting old.

Architects are the ones who plan and design these retrofitting methods. But today's architecture education mostly focuses on building new things, not fixing old ones. So, many young architects don't know enough

about retrofitting or how it helps with the circular economy. This research looks at how prepared students are, what they already know, and what they still need to learn.

We studied 15 main areas in retrofitting and checked the role of architects in each area. Then, we created a survey with yes/no questions to find out what students know, how interested they are, and if they see value in retrofitting. From their answers, we hope to understand how ready they are to work on real projects.

1.1. Why Circular Economy Is Important In Architecture

The circular economy is a smart way of using resources without wasting them. In architecture, this means designing buildings that can last longer, be repaired, or reused in new ways. Instead of breaking old buildings and making new ones all the time, the circular economy encourages architects to fix and improve what we already have.

This idea is very important today because the construction industry uses a lot of natural resources and creates a lot of waste. Every time a building is torn down, materials like cement, wood, and steel go to waste. This also harms nature and adds to climate change. That's why architects now have a big responsibility not just to make beautiful buildings but also to protect the environment.

One way to follow the circular economy is by retrofitting. This means making old buildings safer, stronger, and more useful. It helps save money, time, and materials. Instead of throwing away what we have, we make it better. This fits perfectly with the goals of the circular economy.

Young architects must learn how to design in this new way. They need to understand how to use fewer new materials, how to reuse old ones, and how to design buildings that are flexible and long-lasting. This research helps us see how much students already know about these ideas and what more they need to learn.

Architecture is no longer just about making something new. It's also about taking care of what already exists. By following the circular economy, young architects can help build a better future for both people and the planet.

1.2. Retrofitting As A Circular Economy Solution

Retrofitting means upgrading or fixing old buildings to make them stronger, safer, or more efficient without tearing them down. This can include making columns and beams stronger, improving foundations, adding smart systems, or fixing small things like cracks or old wires. Retrofitting is a very important part of the circular economy because it helps reuse what already exists instead of wasting materials on building something new.

Old buildings often have strong structures, but they might not be safe during earthquakes or may not save energy well. By using retrofitting methods, architects can improve these buildings. This saves money, reduces waste, and helps protect the environment—all main goals of the circular economy.

For young architects, retrofitting is a chance to solve real problems in creative ways. Instead of just designing new buildings, they learn how to improve existing ones. This includes understanding how a building works, where it is weak, and what materials can help make it better.

In this study, we looked at some main retrofitting areas like walls, joints, beams, ceilings, and electric and plumbing systems. We also included smart tech upgrades and eco-friendly changes. For each area, we asked students about their skills and their interest in learning more. We wanted to know: Are they confident in using these techniques? Do they find them valuable? Are they ready to explore retrofitting in their future work?

1.3. Educational Gaps And Student Skills

Most architecture colleges focus on teaching how to design new buildings. But they don't spend much time on teaching students how to fix or improve old buildings. This can create a gap between what students learn in college and what they need to know to work in the real world

In this, we looked at what final-year students know about retrofitting. We found that many students understood the basic ideas like fixing cracks or adding new columns. But they didn't feel confident about technical things like how to work with structure or how to choose the right method for each building type.

We used a framework with some key retrofitting areas. For each one, we matched it with the skills an architect needs. Then we made some questions to check if students had that knowledge. The answers showed that students were very interested in learning more. They also believed retrofitting is important for the future.

Students felt comfortable with non-structural topics like fixing interiors, improving ventilation, or adding insulation. But when it came to more complex work like dealing with beams, columns, and joints they were not confident. They also didn't know much about linking retrofitting to circular economy topics like material reuse, life cycle planning, or low-carbon design

II. LITERATURE REVIEW

In this literature review, we look at what other researchers and professionals have already said about retrofitting, circular economy. This helps us to understand what knowledge is already out there and what is still missing in the circular economy.

2.1 Retrofitting

Retrofitting means improving an old building to make them stronger, safer, or more useful. It includes fixing walls, columns, roofs, or even changing lighting and ventilation. Many researchers agree that retrofitting is better than demolishing buildings, especially in crowded cities. It helps save money, reduce waste, use fewer new materials, and protect our environment.

Studies have shown that retrofitting can reduce energy use in old buildings and improve indoor comfort. For example, changing windows, adding insulation, or fixing small cracks can help reduce energy bills. Some papers also talk about earthquake safety retrofitting helps buildings stay strong during disasters. Retrofitting is also useful when you want to keep the historical look of an old building/heritage while improving its strength and function.

2.2 ARCHITECT'S ROLE IN RETROFITTING

Architects are very important when it comes to retrofitting old buildings. Their job is not just about making things look good but also about solving problems and working with other experts like engineers, builders, designers and clients. Many studies say that architects help plan retrofitting from the early stages. They decide how a building can be improved without collapsing or damaging the building, while still keeping its design and function.

Some research also shows that architects help balance different needs of the building like safety, beauty, and saving materials. For example, when making a building stronger for earthquakes, they have to choose methods that don't spoil the original design. They also think about how people use the building every day and try to make it better and more comfortable and usable for the user.

Another key part of the architect's job is communication. Architects talk to clients, explain ideas, draw plans, and sometimes even help in managing the construction process. Good communication helps everyone understand the plan and idea clearly, which is very important in retrofitting work.

Many researchers say that architecture education must teach students how to work in teams, solve problems in step by step methods, and think long-term. Architects need to know about both design and construction. But many students don't get enough real-life experience in college.

III. RESEARCH METHODOLOGY

In this research methodology, we explain how the study and research was planned and carried out. We created a system to check and survey how well young architects understand retrofitting and the circular economy.

3.1.Method 1

Creating a matrix/framework

3.2. Method 2

Preparing the questionnaire

3.3. Method 3

Quantitative survey

3.4. Method4

Sorting the questions into four categories

3.1.METHOD 1 (CREATING A MATRIX/Framework)

Retrofitting Aspect	Architect's Role	Available Skills	Needed Skills	Strengthening Approach
Foundation Strengthening	Assess design impact, coordinate with structural engineers	Site planning, material selection	Structural analysis, soil mechanics	<ol style="list-style-type: none"> 1. Strengthening foundations prevents uneven settlement and enhances load-bearing capacity. 2. Techniques like underpinning, micropiling, and jet grouting improve soil stability. 3. Seismic retrofitting includes base isolation systems to absorb vibrations. 4. Reinforcement with

				<p>high-strength concrete and steel ensures durability.</p> <p>5. Proper drainage solutions prevent water-induced foundation weakening.</p>
Structural Joints	Improve aesthetics and load distribution	Detailing, material knowledge	Seismic detailing, load calculations	<ol style="list-style-type: none"> 1. Strengthening joints prevents cracks and misalignment due to movement. 2. Flexible connections help absorb seismic and wind forces. 3. Steel plates and fiber-reinforced polymers enhance joint strength. 4. Joints are sealed to prevent moisture penetration and corrosion. 5. Retrofitting includes reconfiguring expansion joints for better adaptability.
Material Replacement	Select new materials, maintain aesthetics	Material science, sustainability	Lifecycle assessment, retrofitting compatibility	<ol style="list-style-type: none"> 1. Modern materials improve structural integrity and energy efficiency. 2. Replacing deteriorated materials prevents long-term degradation. 3. Fiber-reinforced composites add strength without adding excessive weight. 4. Eco-friendly materials reduce carbon footprint and enhance sustainability. 5. High-performance coatings protect surfaces from environmental damage.
Load Redistribution	Space planning, impact assessment	Load path awareness, design flexibility	Advanced structural modeling	<ol style="list-style-type: none"> 1. Reallocating loads helps reduce stress on weaker sections.

				<ol style="list-style-type: none"> 2. Shear walls and redistribution beams balance internal forces. 3. Post-tensioning techniques improve load-bearing capacity. 4. Openings in walls and floors are reinforced to prevent structural weaknesses. 5. Smart load monitoring systems help track and adjust loads dynamically.
Addition of Bracing	Integrate bracing into the design	Aesthetic integration, facade design	Structural bracing methods	<ol style="list-style-type: none"> 1. Steel bracing enhances lateral stability in high-rise structures. 2. Shear walls improve resistance against wind and seismic forces. 3. Cross-bracing prevents excessive swaying in tall buildings. 4. Retrofitting includes using reinforced concrete for added rigidity. 5. Bracing elements are designed to blend aesthetically with existing architecture.
Subtraction of Weak Elements	Identify non-essential or weak elements	Space utilization, interior layout	Demolition techniques, load impact analysis	<ol style="list-style-type: none"> 1. Removing unstable or weak sections prevents progressive collapse. 2. Selective deconstruction helps preserve valuable architectural elements. 3. Advanced scanning tools detect hidden weaknesses before removal. 4. Load transfer strategies ensure safety when removing sections. 5. Weak masonry walls are replaced with reinforced concrete or steel framing.

Seismic Retrofitting	Adapt design for seismic upgrades	Building codes, design adaptation	Earthquake engineering, dynamic analysis	<ol style="list-style-type: none"> 1. Base isolators absorb ground movement, reducing earthquake impact. 2. Energy-dissipating dampers improve structural resilience. 3. Retrofitted shear walls provide additional lateral strength. 4. Column jacketing with fiber-reinforced materials enhances durability. 5. Flexible joints minimize stress on connections during seismic events.
Energy Efficiency Upgrades	Integrate sustainable elements	Passive design, insulation strategies	Advanced energy modeling, HVAC optimization	<ol style="list-style-type: none"> 1. High-performance glazing reduces heat loss and enhances natural lighting. 2. Retrofitting insulation improves thermal efficiency and lowers energy costs. 3. Solar panels and green roofs provide renewable energy solutions. 4. Smart HVAC systems optimize airflow and reduce energy consumption. 5. Energy monitoring systems help track and improve building performance.
Corrosion Protection	Choose corrosion-resistant materials	Material selection, durability focus	Advanced coatings, electrochemical protection	<ol style="list-style-type: none"> 1. Protective coatings prevent rust and material degradation. 2. Cathodic protection stops electrochemical reactions causing corrosion. 3. Waterproofing membranes prevent moisture infiltration. 4. Stainless steel reinforcements enhance

				<p>durability in corrosive environments.</p> <p>5. Regular maintenance and monitoring reduce long-term corrosion risks.</p>
Fireproofing Enhancements	Ensure fire code compliance	Fire-resistant materials, egress planning	Fire dynamics, smoke control	<ol style="list-style-type: none"> 1. Fire-resistant coatings slow down structural weakening in extreme heat. 2. Retrofitting includes installing fireproof barriers and sprinkler systems. 3. Smoke control systems enhance evacuation safety. 4. Non-combustible insulation prevents fire spread within walls. 5. Emergency lighting and escape routes are upgraded for compliance.
Waterproofing Improvements	Improve drainage and moisture protection	Drainage design, facade integration	Hydrology, advanced waterproofing	<ol style="list-style-type: none"> 1. Waterproof membranes protect structural components from water damage. 2. Advanced sealants prevent leaks in joints and openings. 3. Drainage systems redirect water away from the building. 4. Retrofitting includes hydrophobic coatings for exterior surfaces. 5. Vapor barriers control indoor humidity and prevent mold growth.
Accessibility Upgrades	Ensure compliance with accessibility laws	Universal design, circulation planning	ADA/ISO compliance, human-centered design	<ol style="list-style-type: none"> 1. Ramps and elevators improve mobility for all users. 2. Doorways and corridors are widened for wheelchair accessibility. 3. Tactile paving aids visually impaired

				<p>individuals.</p> <p>4. Automated doors and voice-assisted systems enhance usability.</p> <p>5. Compliance with global standards ensures inclusivity in design.</p>
Roof Reinforcement	Optimize load-bearing capacity	Roofing materials, load estimation	Structural load assessment, weatherproofing	<ol style="list-style-type: none"> 1. Reinforced trusses increase roof stability in extreme conditions. 2. Waterproof membranes protect against leaks and moisture damage. 3. Additional insulation improves energy efficiency and climate control. 4. Upgraded roofing materials resist wind and snow loads. 5. Green roofs provide both structural and environmental benefits.
Smart Technology Integration	Plan for sensor and automation integration	Smart building design, tech awareness	IoT systems, building automation	<ol style="list-style-type: none"> 1. Sensors detect structural weaknesses and provide real-time data. 2. Automated climate control systems optimize energy use. 3. Smart lighting enhances efficiency and user comfort. 4. Retrofitted security systems improve building safety. 5. AI-driven predictive maintenance reduces repair costs.
Facade & Aesthetic Enhancements	Improve exterior durability and appearance	Façade design, material aesthetics	Advanced cladding, weatherproof coatings	<ol style="list-style-type: none"> 1. High-performance cladding improves weather resistance. 2. Ventilated facades enhance thermal insulation. 3. Modern coatings

			provide UV and pollution protection. 4. Retrofitted glass facades enhance natural light without heat gain. 5. Aesthetic upgrades maintain architectural heritage while modernizing function.
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3.2.METHOD 2 (PREPARING THE QUESTIONNAIRE)

Using the matrix, we created some simple questions. Each one was based on a different part of retrofitting or circular design. For example, questions asked if students knew how to fix beams, or if they were interested in learning about energy-saving upgrades.

All questions were very easy to answer most type of question is a **Yes or No type question**, and also we asked about interest or importance. The questions are

QUESTIONS FOR YOUNG ARCHITECTS ABOUT CIRCULAR ECONOMY

PART – A

FOUNDATION STRENGTHENING

1. Do you understand the importance of strengthening foundations?

Yes	Not sure	No
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2. Are you familiar with underpinning techniques like micropiling and jet grouting?

Yes	Not sure	No
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3. Do you think base isolation can effectively prevent earthquake damage?

Yes	Not sure	No
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4. Would you consider drainage solutions essential for foundation durability?

Yes	Not sure	No
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STRUCTURAL JOINTS

5. Do you know how structural joints help in preventing misalignment?

Yes	Not sure	No
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6. Are flexible joints useful in absorbing seismic forces?

Yes	Not sure	No
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7. Can expansion joints be reconfigured to improve adaptability?

Yes	Not sure	No
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8. Have you studied how moisture affects joint durability?

Yes	Not sure	No
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MATERIAL REPLACEMENT

9. Are you aware of modern materials that improve energy efficiency?

Yes	Not sure	No
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10. Do you think **fiber-reinforced composites** can replace traditional materials effectively?

Yes	Not sure	No
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11. Do you know about **high-performance coatings** for environmental protection?

Yes	Not sure	No
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12. Would you prefer **lifecycle assessment** before choosing materials for retrofitting?

Yes	Not sure	No
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LOAD REDISTRIBUTION

13. Do you think **shear walls** help in balancing internal structural forces? (Yes/No)

Yes	Not sure	No
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14. Have you studied how **redistribution** beams reduce stress in buildings? (Yes/No)

Yes	Not sure	No
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15. Have you explored **smart load monitoring systems** for structural analysis?

Yes	Not sure	No
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16. Do you think reinforcing openings in floors and walls enhances safety?

Yes	Not sure	No
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ADDITION OF BRACING

17. Have you studied how **cross-bracing** improves high-rise stability?

Yes	Not sure	No
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18. Do you know how shear walls increase resistance against wind and seismic loads?

Yes	Not sure	No
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19. Have you observed real-life applications of steel bracing?

Yes	Not sure	No
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20. Do you believe aesthetic integration of bracing is important in retrofitting?

Yes	Not sure	No
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SEISMIC RETROFITTING

21. Do you understand the role of **base isolators** in earthquake-resistant buildings?

Yes	Not sure	No
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22. Have you studied how **dampers** dissipate seismic energy?

Yes	Not sure	No
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23. Do you think **retrofitted shear walls** are an effective solution for earthquake-prone zones?

Yes	Not sure	No
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24. Would you consider flexible joints necessary in seismic retrofitting?

Yes	Not sure	No
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ENERGY EFFICIENCY UPGRADES

25. You know how **high-performance glazing** reduces heat loss?

Yes	Not sure	No
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26. Have you explored the benefits of **smart HVAC systems** in retrofitting?

Yes	Not sure	No
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27. Would you consider installing **solar panels** as an effective retrofitting method?

Yes	Not sure	No
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28. Do you think energy monitoring systems can improve building performance?

Yes	Not sure	No
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FACADE & AESTHETIC ENHANCEMENTS

29. Do you think **ventilated facades** improve thermal insulation?

Yes	Not sure	No
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30. Have you explored how modern coatings protect against UV and pollution?

Yes	Not sure	No
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31. Do you believe **glass facades** can enhance natural lighting while controlling heat gain?

Yes	Not sure	No
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PART – B

FOUNDATION STRENGTHENING

1. How interested are you in
- structural analysis**
- for strengthening foundations?

Highly interested	Medium interested	Not interested
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2. Do you find
- soil mechanics**
- important for foundation design?

Yes	Not sure	No
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STRUCTURAL JOINTS

3. Are you interested in
- seismic detailing**
- for improving joint stability?

Highly interested	Medium interested	Not interested
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4. Do you want to explore
- load calculations**
- for structural connections?

Yes	Not sure	No
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MATERIAL REPLACEMENT

5. How would you rate your interest in
- lifecycle assessment**
- for materials?

Highly interested	Medium interested	Not interested
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6. Are you keen on learning about
- retrofitting compatibility**
- in material replacement?

Yes	Not sure	No
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LOAD REDISTRIBUTION

7. Do you find
- advanced structural modeling**
- important in redistributing loads?

Yes	Not sure	No
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8. Are you interested in
- load path awareness**
- for balancing forces in a building?

Highly interested	Medium interested	Not interested
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ADDITION OF BRACING

9. How interested are you in
- structural bracing methods**
- for earthquake-resistant design?

Highly interested	Medium interested	Not interested
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10. Would you like to learn more about
- facade integration**
- with structural bracing?

Yes	Not sure	No
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SEISMIC RETROFITTING

11. Do you find
- earthquake engineering**
- an exciting field to explore?

Yes	Not sure	No
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ENERGY EFFICIENCY UPGRADES

12. Are you interested in **advanced energy modeling** for sustainable buildings?

Highly interested	Medium interested	Not interested
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13. Would you like to explore **HVAC optimization** to improve energy efficiency?

Yes	Not sure	No
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CORROSION PROTECTION

14. Do you think **electrochemical protection** is essential in long-term building durability?

Yes	Not sure	No
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15. How interested are you in **advanced coatings** for corrosion resistance?

Highly interested	Medium interested	Not interested
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SMART TECHNOLOGY INTEGRATION

16. Do you find **building automation** a key skill for future architects?

Yes	Not sure	No
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FACADE & AESTHETIC ENHANCEMENTS

17. How interested are you in **weatherproof coatings** for facade durability?

Yes	Not sure	No
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3.3.METHOD 3 (QUANTITATIVE SURVEY)

We gave the questionnaire to final-year students at Sigma College of Architecture. These students were chosen because they are about to become professionals and might work on real projects. Since the answers were in Yes/No form, this made it easy to count and analyze the results.

RESULT IN % FOR EACH QUESTION

Question No	Question Description	Yes (%)	Not Sure (%)	No (%)
1	Do you understand the importance of strengthening foundations?	68	18	14
2	Are you familiar with underpinning techniques like micropiling and jet grouting?	70	15	15
3	Do you think base isolation can effectively prevent earthquake damage?	65	20	15
4	Would you consider drainage solutions essential for foundation durability?	72	15	13
5	Do you know how structural joints help in preventing misalignment?	66	20	14
6	Are flexible joints useful in absorbing seismic forces?	75	10	15
7	Can expansion joints be reconfigured to improve adaptability?	54	30	16
8	Have you studied how moisture affects joint durability?	60	25	15
9	Are you aware of modern materials that improve energy	70	20	10

	efficiency?			
10	Do you think fiber-reinforced composites can replace traditional materials effectively?	68	20	12
11	Do you know about high-performance coatings for environmental protection?	62	25	13
12	Would you prefer lifecycle assessment before choosing materials for retrofitting?	63	22	15
13	Do you think shear walls help in balancing internal structural forces?	67	18	15
14	Have you studied how redistribution beams reduce stress in buildings?	66	22	12
15	Have you explored smart load monitoring systems for structural analysis?	64	25	11
16	Do you think reinforcing openings in floors and walls enhances safety?	72	14	14
17	Have you studied how cross-bracing improves high-rise stability?	75	12	13
18	Do you know how shear walls increase resistance against wind and seismic loads?	68	17	15
19	Have you observed real-life applications of steel bracing?	71	19	10
20	Do you believe aesthetic integration of bracing is important in retrofitting?	63	20	17
21	Do you understand the role of base isolators in earthquake-resistant buildings?	69	19	12
22	Have you studied how dampers dissipate seismic energy?	62	23	15
23	Do you think retrofitted shear walls are an effective solution for earthquake-prone zones?	60	22	18
24	Would you consider flexible joints necessary in seismic retrofitting?	65	25	10
25	You know how high-performance glazing reduces heat loss?	70	20	10
26	Have you explored the benefits of smart HVAC systems in retrofitting?	68	19	13
27	Would you consider installing solar panels as an effective retrofitting method?	77	15	8
28	Do you think energy monitoring systems can improve building performance?	74	16	10
29	Do you think ventilated facades improve thermal insulation?	71	15	14
30	Have you explored how modern coatings protect against UV and pollution?	68	18	14
31	Do you believe glass facades can enhance natural lighting while controlling heat gain?	72	14	14
32	How interested are you in structural analysis for strengthening foundations?	72	16	12
33	Do you find soil mechanics important for foundation design?	76	14	10
34	Are you interested in seismic detailing for improving joint stability?	71	15	14
35	Do you want to explore load calculations for structural connections?	70	14	16
36	How would you rate your interest in lifecycle assessment for materials?	65	15	20
37	Are you keen on learning about retrofitting compatibility in material replacement?	76	14	10
38	Do you find advanced structural modeling important in redistributing loads?	74	12	14
39	Are you interested in load path awareness for balancing forces in a building?	71	15	14

40	How interested are you in structural bracing methods for earthquake-resistant design?	73	14	13
41	Would you like to learn more about facade integration with structural bracing?	77	13	10
42	Do you find earthquake engineering an exciting field to explore?	75	14	11
43	Are you interested in advanced energy modeling for sustainable buildings?	71	16	13
44	Would you like to explore HVAC optimization to improve energy efficiency?	74	14	12
45	Do you think electrochemical protection is essential in long-term building durability?	78	15	7
46	How interested are you in advanced coatings for corrosion resistance?	75	14	11
47	Do you find building automation a key skill for future architects?	76	12	12
48	How interested are you in weatherproof coatings for facade durability?	78	10	12

3.4. METHOD 4 (SORTING THE QUESTIONS INTO FOUR CATEGORIES)

To make our study more meaningful, we organized the questions into four groups:

- **Capacity** – What students already know
- **Interest** – How eager they are to learn more
- **Value** – How important they think retrofitting and circular design are
- **Explore** – How willing they are to try these ideas in real work

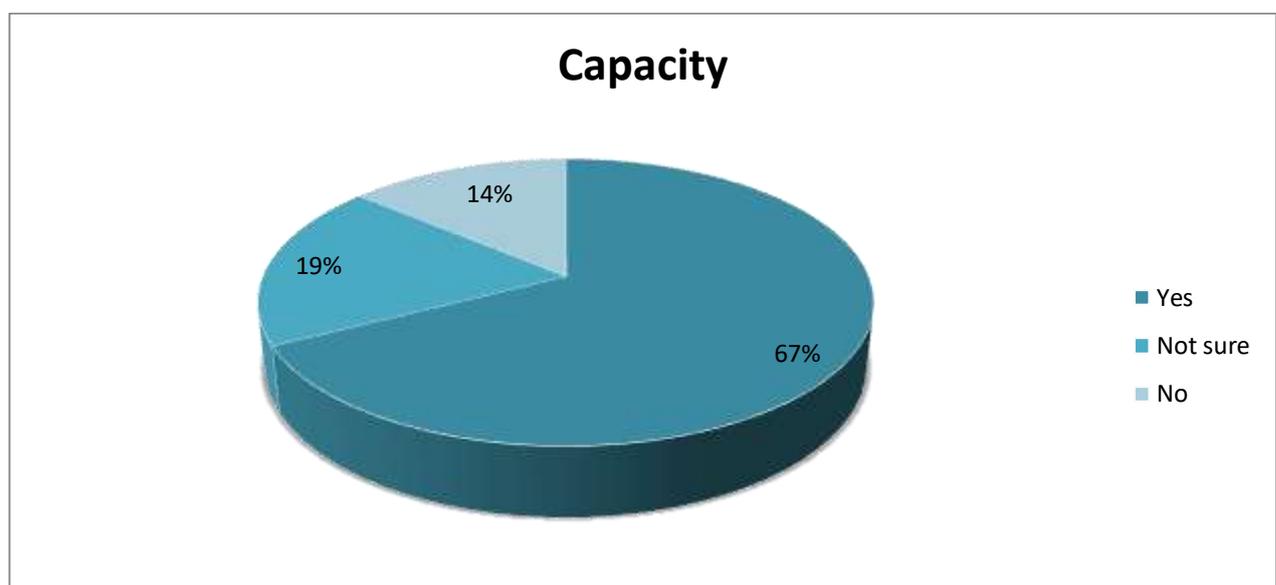
By using these four areas, we were able to see where students feel strong and where they need more help.

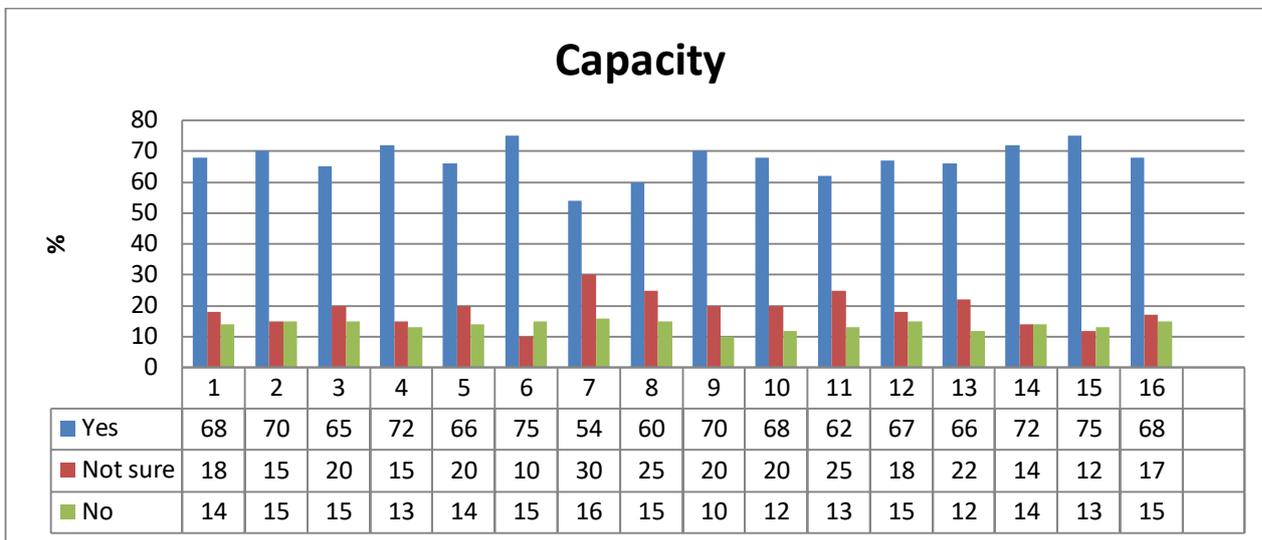
Capacity (16 Questions)

These questions assess the architects' knowledge and understanding of fundamental architectural and structural concepts and practices.

Overall Capacity Percentage:

- Average **Yes**: 67.4%
- Average **Not Sure**: 18.8%
- Average **No**: 13.8%



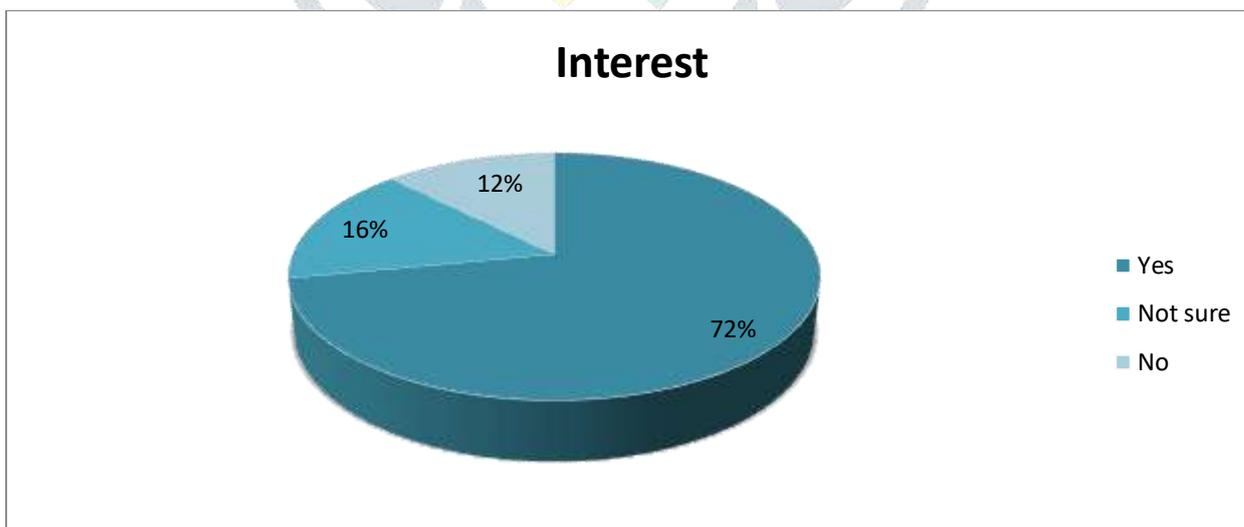


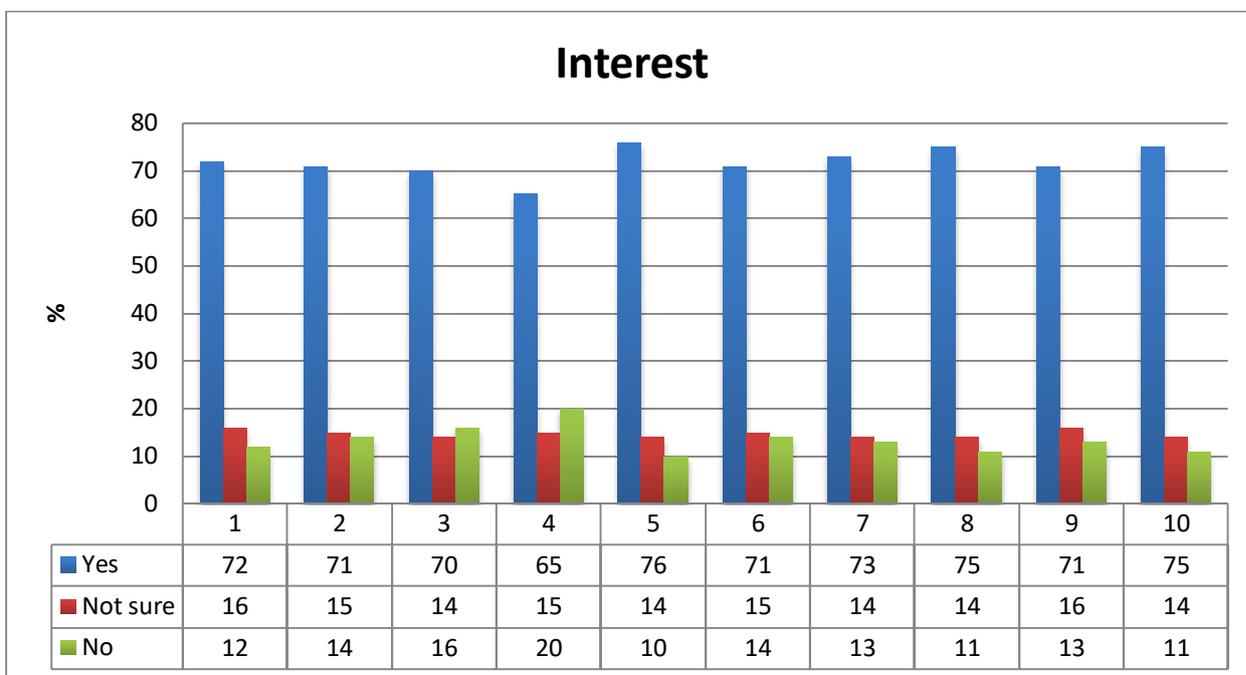
Interest (10 Questions)

These questions directly gauge the architects' interest levels in various specialized areas.

Overall Interest Percentage:

- Average **Yes (Interested)**: 71.9%
- Average **Not Sure**: 15.7%
- Average **No (Not Interested)**: 12.4%



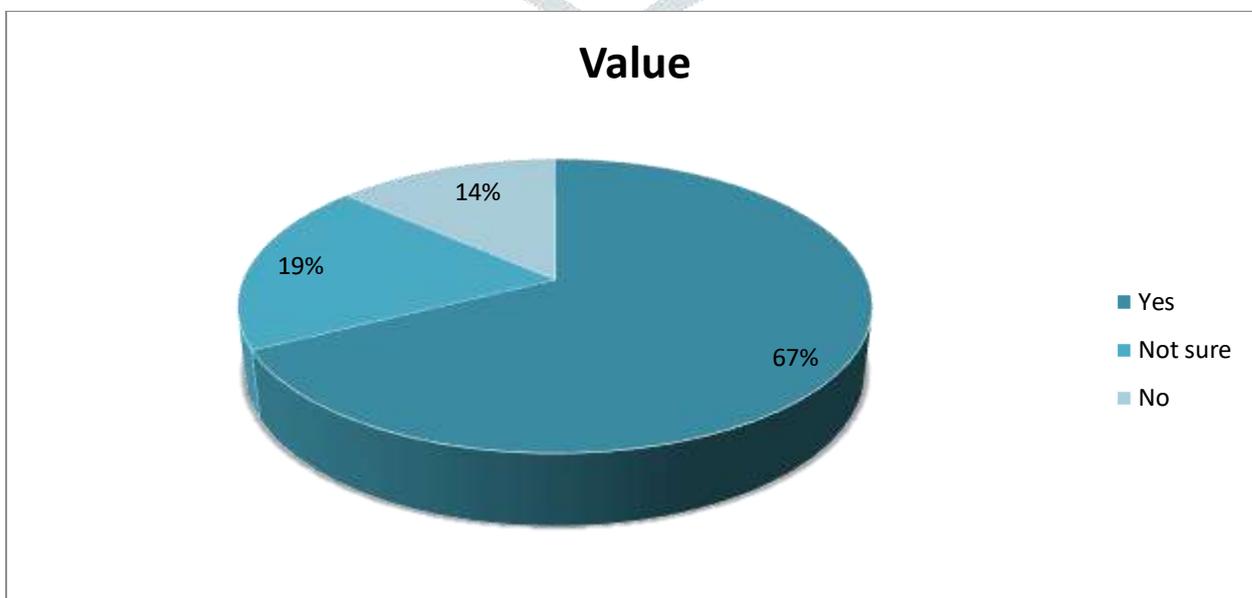


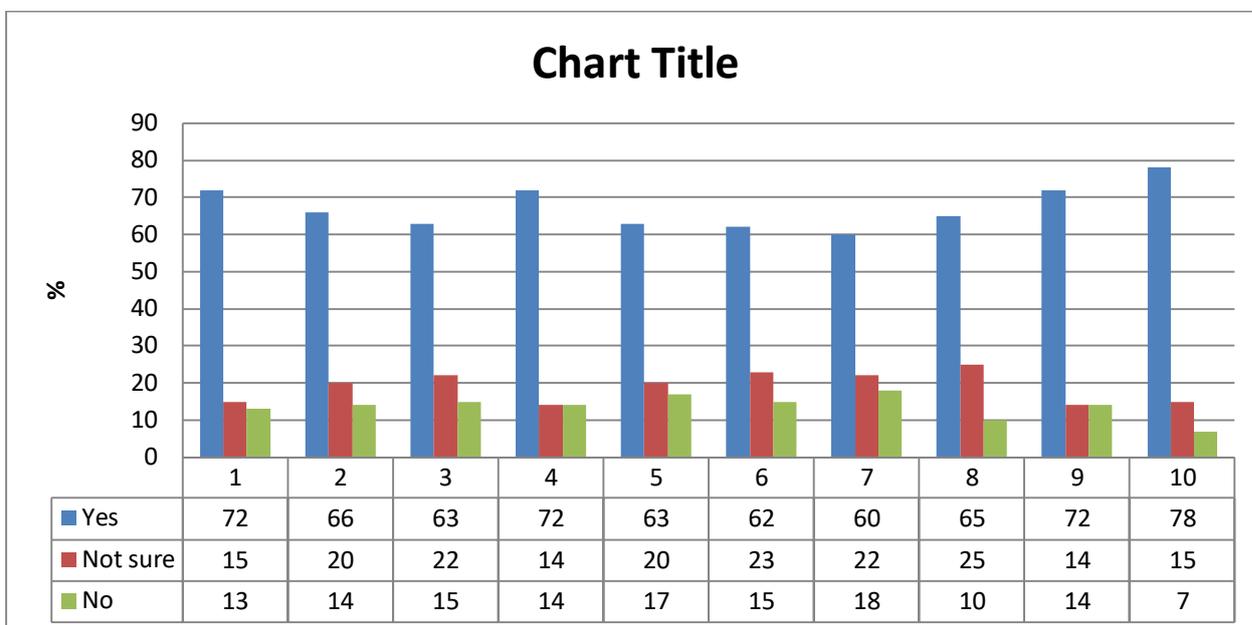
Value (10 Questions)

These questions assess the perceived importance or value of certain architectural elements, techniques, or considerations.

Overall Value Percentage:

- Average **Yes**: 67.5%
- Average **Not Sure**: 19.0%
- Average **No**: 13.5%



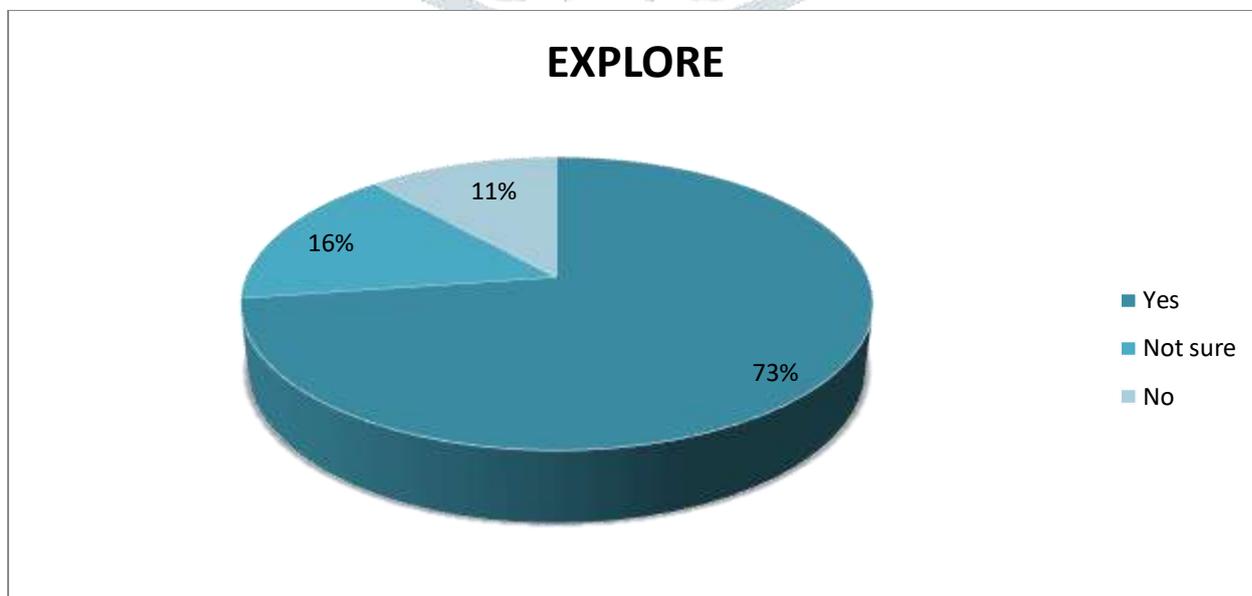


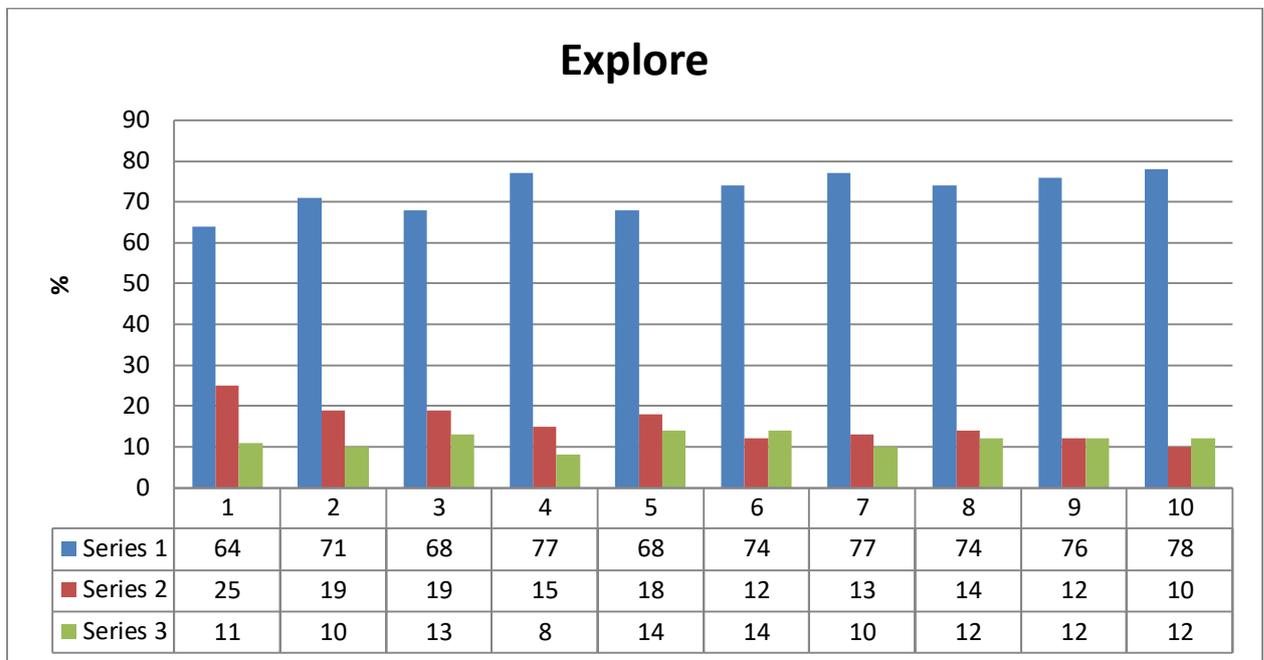
Explore (10 Questions)

These questions highlight areas where young architects are willing to learn more or explore further. These often overlap with "Interest" but emphasize a proactive desire to investigate.

Overall Explore Percentage:

- Average **Yes**: 72.7%
- Average **Not Sure**: 15.7%
- Average **No**: 11.6%





IV. RESULT AND DISCUSSION

This explains what we got to know from the answers given by the architecture students and what those answers mean. It is based on the survey results and grouped into different levels of student readiness.

4.1. Areas Where Young Architects Are Ready

From the survey results, we found that many students already understand the basic ideas of retrofitting. For example, they know how to improve walls, ceilings, and simple building parts to make them safer and more energy-efficient. They also know better lighting and ventilation, and the importance of saving resources through retrofitting.

Students also agreed that retrofitting is better than destroying/demolishing old buildings. They believe this method saves money, helps reduce pollution, and allows old buildings to be reused instead of replaced. Many showed a strong interest in learning more about retrofitting during their studies.

students are mentally ready and willing to take part in retrofitting projects. They also value the idea of the circular economy and want to use it in real-life designs.

AREAS YOUNG ARCHITECTS ARE READY

Topics with majority of responses (above 70% "Yes") indicate strong familiarity or interest:

1. Foundation Strengthening:

- ✓ Importance of strengthening foundations (68% "Yes").
- ✓ Familiarity with underpinning techniques like micropiling (70% "Yes").
- ✓ Drainage solutions for foundation durability (72% "Yes").

2. Structural Joints:

- ✓ Flexible joints for absorbing seismic forces (75% "Yes").

3. Material Replacement:

- ✓ Awareness of modern materials for energy efficiency (70% "Yes").
- ✓ Reinforcing openings in floors and walls to enhance safety (72% "Yes").
- ✓ High interest in retrofitting compatibility (76% "Interested").
- ✓ Solar panels as retrofitting methods (77% "Yes").

4. Load Redistribution:

- ✓ Cross-bracing for high-rise stability (75% "Yes").
- ✓ Building automation and smart systems (76% "Yes").
- ✓ Weatherproof coatings for facade durability (78% "Yes").

4.2. Areas Where Young Architects Are Partially Ready

The students showed strong interest, the survey also showed that they are not fully confident when it comes to more complex retrofitting tasks. These include strengthening foundations, joints, and columns parts of a building that carry heavy loads and require structural knowledge.

Students also had less understanding of new technologies, like using smart sensors or systems that save energy automatically. When it came to working with engineers or planning the technical side of retrofitting, many students did not feel prepared.

The area where students were only partially ready was understanding how retrofitting connects with life-cycle planning. For example, many didn't know how to calculate the environmental impact of reused materials or how to plan for a building that will last a long time.

AREAS YOUNG ARCHITECTS ARE PARTIALLY READY

1. Foundation Strengthening:

- ✓ Base isolation techniques (20% "Not Sure").
- ✓ Reconfiguring expansion joints for adaptability (30% "Not Sure").

2. Structural Joints:

- ✓ Durability impacted by moisture (25% "Not Sure").
- ✓ High-performance coatings for environmental protection (25% "Not Sure").

3. Material Replacement:

- ✓ Fiber-reinforced composites as replacements (20% "Not Sure").
- ✓ Lifecycle assessments for retrofitting materials (22% "Not Sure").

4. Load Redistribution:

- ✓ Smart load monitoring systems (25% "Not Sure").
- ✓ Redistribution beams reducing stress (22% "Not Sure").

V. CONCLUSION

This research shows that the young architects understand the importance of retrofitting and are interested in using it to support the circular economy. They believe that making old buildings safer and more efficient is better than tearing or demolishing and making them down. Many students also value sustainability and want to design buildings that are good for the planet.

This survey found that most of the students have basic knowledge of retrofitting. They know how to improve walls, ceilings, and non-structural parts of buildings. They also showed strong interest in learning more and saw retrofitting as useful and important. This means they are mentally ready and excited to use these ideas in their future construction work.

However, in some areas still Students didn't feel very confident when it came to more technical retrofitting work, like fixing joints, columns, and foundations. Many of them were also unsure about using smart technologies and applying circular economy ideas like material reuse or life cycle planning.

This shows that architecture schools need to do more. Colleges should add retrofitting lessons into regular design classes. They can also offer hands-on workshops, site visits, and group projects focused on real life buildings. By doing this, students will feel more confident and ready to work on real-life retrofitting tasks.

In the future, architects will play a big role in saving resources and creating sustainable cities. If students are taught well today, they will be better prepared to handle the challenges of tomorrow world. Retrofitting and circular economy thinking is not just optional topics but they are the future of smart, responsible design.

VI. REFERENCE

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