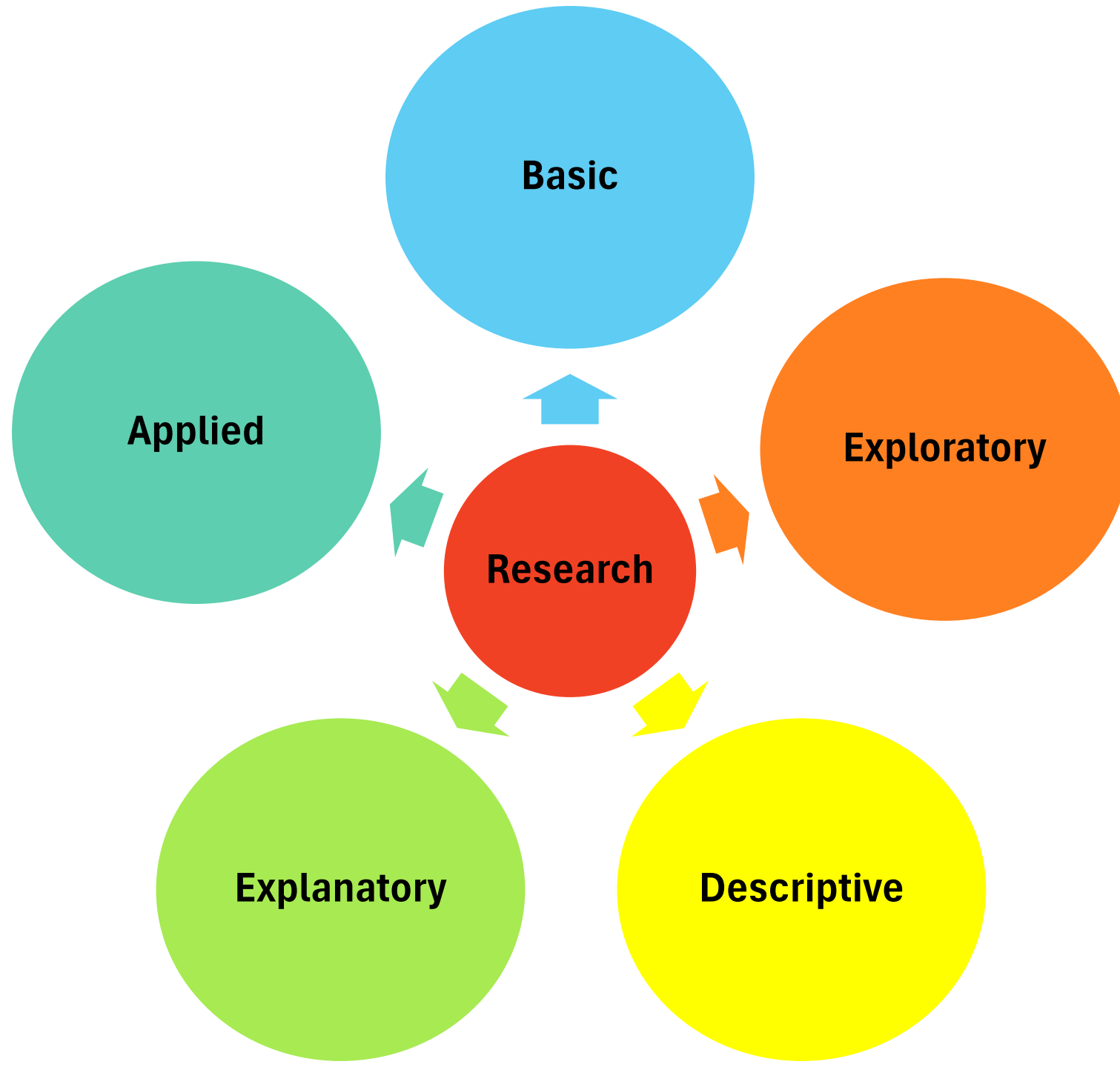


A decorative graphic consisting of 15 colored circles arranged in a 3x5 grid. The top row contains red, orange, yellow, light green, and teal circles. The middle row contains light blue, purple, red, orange, and yellow circles. The bottom row contains light green, teal, light blue, purple, and red circles. The text "Types of Research" is centered horizontally across the middle row of circles.

Types of Research



Exploratory Research

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- Exploratory research is an approach used to investigate a problem or a topic that has not been clearly defined or studied in depth.
- It aims to gain insights, understand patterns, and gather preliminary data to help identify key issues and formulate a more precise research question for future studies.
- Unlike other research types, exploratory research is more flexible, open-ended, and unstructured, allowing researchers to explore new ideas and hypotheses without rigid frameworks.

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- Exploratory research plays a vital role in addressing these emerging issues when little is known about them or when innovative solutions are sought.

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Example: Conducting exploratory research to investigate how AI can be used for optimising construction project schedules and identifying risks. Since this is a relatively new area, the research would focus on exploring potential applications, challenges, and benefits rather than providing definitive answers.

Exploratory Research

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Example: Exploring the potential use of biodegradable materials in construction. Since little might be known about their suitability for large-scale projects, an exploratory study could investigate factors like durability, cost, and regulatory requirements

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Example: Exploring reasons behind frequent delays in high-rise construction projects in congested urban areas. An exploratory study could involve interviews with project managers, contractors, and urban planners to gather insights that would later guide more detailed explanatory or descriptive research.

Exploratory Research

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Example: Conducting exploratory research to understand how recently updated fire safety regulations affect the choice of materials and construction methods for skyscrapers. The study might explore industry perceptions and early-stage compliance challenges

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Example: An exploratory study assessing the feasibility of developing affordable housing projects in a new suburban area, focusing on market demand, available land, and potential costs.

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Case Studies: Investigating new or ongoing construction projects to identify patterns or issues that need further exploration.

Literature Reviews: Reviewing existing research in related fields to identify gaps or opportunities for innovation in construction.

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Adapts to Uncertainty: Flexible enough to adapt to rapidly changing technological landscapes and market conditions in the construction sector.

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Unlike exploratory research, descriptive research has a more defined structure and objective, aiming to present a clear picture of the "what" without delving into the "why."

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This type of research provides a snapshot of the current state of affairs, which is crucial for decision-making, planning, and regulatory compliance.

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Context: The construction industry is subject to fluctuating market trends driven by factors such as economic conditions, population growth, and government policies. Descriptive research is essential for analysing these trends and understanding how they affect construction demand, labour markets, material prices, and technology adoption.

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Example: A descriptive study examining the adoption rates of sustainable building practices in urban construction projects across different regions. The research could gather data on the number of green-certified buildings, the types of materials being used, and the cost impacts of sustainable methods. This provides a clear view of current industry practices without attempting to explain the reasons behind those trends.

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Example: A study analysing the average duration and costs of road construction projects in a particular country. By describing factors such as project size, material costs, labour involvement, and weather impacts, construction managers can identify patterns that may inform future projects. This information helps in planning and resource management without exploring cause-and-effect relationships.

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Example: A descriptive report on workplace injuries in the construction industry, detailing the types of injuries, their frequency, and the specific construction tasks or equipment associated with these incidents. Such data can help safety officers understand common risk areas and focus efforts on improving safety protocols in the field.

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Example: A survey-based descriptive study that evaluates the percentage of construction workers trained in using advanced construction technologies like BIM (Building Information Modelling) or drones. The findings would provide a clear picture of the current skill distribution across the industry, informing future training programs and educational initiatives.

Descriptive Research

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Example: A descriptive study that gathers data on the types of building materials used in low-energy housing projects. This could include percentages of projects using concrete, timber, steel, and alternative materials. The findings give stakeholders a comprehensive understanding of material preferences and usage patterns.

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- **Case Studies:** Detailed descriptions of specific construction projects, including timelines, costs, resources, and challenges.
- **Reports and Documentation:** Gathering and analysing industry reports, safety logs, and compliance documents to describe the current state of construction activities.

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- **Identifying Trends:** Helps track trends in technology adoption, workforce skills, material usage, and sustainability practices, allowing for strategic planning and decision-making.
- **Improving Efficiency and Safety:** By documenting practices and identifying common characteristics of successful (or problematic) projects, descriptive research helps improve construction efficiency and safety.

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- This type of research is more structured and often follows descriptive or exploratory research, as it focuses on understanding the causes of specific problems or behaviours.

Explanatory Research

- The construction industry is complex and involves numerous variables such as cost, time, quality, labour, safety, materials, and technology. Explanatory research is essential in construction because it helps stakeholders understand why certain problems arise, how variables interact, and what can be done to address challenges effectively.

Explanatory Research

- **Context:** Construction projects often face delays and cost overruns due to a range of factors, such as poor planning, miscommunication, resource shortages, or unforeseen challenges. Explanatory research investigates the specific reasons behind these issues to help prevent them in the future.

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- **Context:** Construction projects often face delays and cost overruns due to a range of factors, such as poor planning, miscommunication, resource shortages, or unforeseen challenges. Explanatory research investigates the specific reasons behind these issues to help prevent them in the future.
- **Example:** An explanatory study could examine why large infrastructure projects frequently experience delays. The research might look at factors such as weather conditions, supply chain disruptions, or contractor performance, and analyse the relationships between these variables to identify the most significant causes of delays.

Explanatory Research

- **Context:** The construction industry is rapidly adopting new technologies such as Building Information modelling (BIM), drones, 3D printing, and artificial intelligence (AI). However, while these technologies promise improved efficiency, explanatory research is needed to understand how they affect project performance in terms of cost, time, and quality.

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- **Example:** A study could investigate the effectiveness of BIM in reducing project timelines and improving collaboration between stakeholders. By comparing projects that use BIM with those that don't and analysing variables such as project communication and error reduction, the research would explain how and why BIM leads to greater efficiency.

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- **Example:** An explanatory study might explore the relationship between the level of technical training in construction workers and the occurrence of structural defects in completed projects. By analysing data from multiple projects, the study could show how better training leads to fewer defects and higher construction quality

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- **Example:** A study could explain the relationship between safety training and accident rates on construction sites. The research would collect data on training programs, safety protocol enforcement, and incident reports to identify which training practices lead to fewer accidents and why certain sites may still experience higher accident rates despite safety measures

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- **Example:** A study could analyse the impact of new environmental regulations on the use of sustainable materials in construction. By comparing pre- and post-regulation data on material selection, costs, and project timelines, the research would explain how and why the new regulations influence construction practices.

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- **Example:** An explanatory study could investigate why green building technologies are not widely used in low-income housing projects. The study might look at variables such as costs, contractor knowledge, and government incentives, and explain how these factors contribute to the slow adoption of sustainable practices.

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- **Case Studies:** In-depth analysis of specific projects or situations to explain causes of success or failure.
- **Comparative Studies:** Comparing different construction sites, techniques, or technologies to explain differences in outcomes.

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- **Innovation and Optimisation:** Explanatory research provides insights into how new technologies and practices improve (or hinder) project performance, supporting innovation and process optimisation.
- **Risk Management:** Helps in understanding and mitigating risks by explaining factors that contribute to accidents, delays, or poor project outcomes.

Applied Research

- Applied research focuses on finding practical solutions to real-world problems. It involves using existing knowledge to address specific challenges, improve processes, or develop innovations that have direct applications. In contrast to theoretical research, which seeks to expand general knowledge, applied research is goal-oriented and aims to solve immediate issues or improve performance in a particular field.

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- Applied research plays a crucial role in helping professionals solve specific problems related to project efficiency, cost management, safety, sustainability, and technology integration.
- It helps to bridge the gap between theory and practice, ensuring that construction projects can operate more efficiently, safely, and sustainably.

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- **Context:** Construction professionals are always seeking ways to improve building techniques and materials to enhance durability, reduce costs, and ensure sustainability. Applied research is vital in testing and optimising new construction methods or materials in real-world settings.

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- **Example:** Applied research could focus on the development and testing of high-performance concrete that can withstand extreme weather conditions. By conducting experiments on different concrete mixtures, researchers can determine the best formulation to be used in projects exposed to harsh environments (e.g., coastal areas or regions with heavy snowfall)

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- **Example:** Research aimed at designing and testing wearable technology (e.g., smart helmets or vests with sensors) that can alert workers and managers to dangerous situations, such as exposure to high heat or potential falls. The findings from this applied research would directly lead to improved safety practices and fewer accidents.

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- **Example:** Applied research might investigate the effectiveness of green roofs in reducing urban heat islands and improving insulation in buildings. By testing different types of vegetation and installation methods, the research could provide practical guidelines for construction firms to follow, improving the sustainability of their projects.

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- **Example:** Research could explore the use of artificial intelligence (AI) and machine learning in predicting construction delays based on historical data. By applying AI models to real-world construction projects, researchers can provide project managers with predictive tools that help anticipate issues and make better decisions in real-time

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- **Example:** Applied research might evaluate the impact of smart building technologies such as automated lighting and heating systems on overall energy consumption in commercial buildings. By analysing data from actual buildings, researchers can determine how much energy is saved and how these systems can be improved for wider application.

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- **Example:** Research focused on flood-resistant building designs in coastal areas might involve testing new materials or foundation techniques that can prevent water damage. The outcomes of this applied research can guide new regulations and design standards for construction in flood-prone regions

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- **Surveys and Case Studies:** Collecting data from ongoing construction projects to analyse the application of new techniques or tools in the industry.

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- **Sustainability and Energy Savings:** Develops eco-friendly practices and technologies that reduce environmental impact and improve energy efficiency in buildings.

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- **Cost and Time Reduction:** Helps construction firms reduce project costs and timelines by optimising resource management, project scheduling, and technology use.

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- Basic research often lays the groundwork for future applied research by providing the theoretical framework or insights needed for practical solutions.

Basic Research

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Basic Research

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- The insights gained from basic research lead to breakthroughs that eventually shape the way buildings are designed, constructed, and maintained. It provides the scientific foundation for innovations that can transform construction practices in the future.

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- **Example:** Basic research into the nanostructure of concrete can reveal how cement particles bond and harden over time. By understanding these processes at a molecular level, scientists can develop stronger, more durable concretes that resist cracking and wear, ultimately leading to longer-lasting infrastructure.

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- **Example:** Basic research into nonlinear structural behaviour under extreme loads, such as during an earthquake, helps engineers refine their understanding of building deformation and failure mechanisms. These insights are later applied to develop earthquake-resistant building designs or improve construction codes, but the initial research focuses on understanding the underlying physics.

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- **Example:** Research on the long-term degradation of construction materials in different climates helps us understand how building materials like wood, steel, and concrete interact with the environment. This knowledge can inform the development of new, more sustainable materials and construction practices, as well as help reduce the environmental footprint of future projects.

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- **Example:** Basic research on thermal comfort models might explore how different people experience heat in various types of buildings. This knowledge helps engineers and architects design HVAC systems that are more energy-efficient and better tailored to occupants' needs, but the initial research focuses on understanding how humans respond to temperature in built environments.

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- **Example:** Researchers may develop a theoretical framework for understanding decision-making processes on large construction projects. Although this might not lead to immediate changes in construction practices, it contributes to a deeper understanding of how project managers make decisions under uncertainty, which can later inform new project management tools or methodologies.

Basic Research

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- **Example:** Research on the kinematics of robotic arms or AI-driven decision-making doesn't immediately lead to deployable construction robots but builds the theoretical knowledge needed to eventually design robots capable of laying bricks or performing inspections autonomously.

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- **Literature Reviews:** Synthesising existing knowledge to identify gaps in our understanding of foundational issues in construction

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- **Future-Ready Technologies:** Theoretical research into automation and robotics helps prepare the construction industry for future technological advancement

Activity

- Each group will analyse a case study and determine which type of research it represents (exploratory, descriptive, explanatory, applied, or basic).
- You will identify:
 - The problem or research question.
 - The research approach and methodology to use.
 - Why this research type would be appropriate for the study.

Activity



Investigating the use of drones for site inspection in high-rise construction.



Examining the relationship between project delays and contractor performance.



A study describing the effects of weather on construction schedules in different regions.



Laboratory study on new materials for fire-resistant building cladding.



Research into modular construction to address housing shortages in urban areas.

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BASIC

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APPLIED