

# Villa College

# RESEARCH DIGEST



VC Research Digest provides updates on current and ongoing research projects of Villa College staff and students, and provides fresh research ideas and snippets to help expand the horizon of research and inquiry.

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## Policy Analysis and Using Research to Inform Policy Decisions

Dr Ahmed Shahid, Editor

From governments to various State institutions, from businesses to civil society organisations and to the level of individuals, it makes sense to base our decisions on verifiable evidence. By implication, this means that policy analysis and research evidence ought to form the basis for new policy implementation and continuation of existing policies. However, one of the perennial complaints in the Maldivian society is that evidence-based and research-informed policymaking still remains outside the governance milieu of the country. Perhaps, as researchers, the status quo should prompt us to take policy analysis more seriously and re-orient our research efforts to be more aligned with what matters most from a policy angle.

Policy analysis involves a systematic and robust evaluation of policy alternatives to address public issues, such as education, healthcare, housing, social security, etc. Such analytical processes typically begin with defining the problem and setting clear objectives. Clarity will be required on the desired objectives of the policy and how the policy actions are expected to be translated to action as well as the theory of change that explains the interaction of relevant variables that eventually bring about the desired change. Policy analysts then gather and analyse relevant data, considering various policy options and assessing their potential impacts at the collective and individual level. Techniques such as cost-benefit analysis, risk assessment, and stakeholder analysis are often employed to evaluate these alternatives within the given policy context. The goal is to provide evidence-based recommendations that policymakers can use to make informed decisions, ensuring that the targeted policies effectively address the identified problems while considering the constraints and opportunities of the political, economic, and social contexts.

We have to remember that effective policy analysis relies heavily on robust data collection and rigorous research methodologies.

Quantitative datasets, such as census, statistics and economic indicators, provide a solid foundation for understanding the scope and scale of issues. Secondary data published by the Maldives Bureau of Statistics, Maldives Monetary Authority and other relevant State agencies can be crucial to understand how various policies impact the ground realities. In addition, qualitative data, gathered through interviews, focus groups, and case studies, offer insights into the lived experiences and perspectives of affected communities. Combining these data types enables a comprehensive analysis that captures both the measurable impacts and the human dimensions of policy issues.

Using research to inform policy decisions involves translating research findings into actionable recommendations. This process, which is also known as knowledge translation, ensures that the evidence generated through policy research is effectively communicated to policymakers and other stakeholders. This can be done through multiple platforms such as policy briefs, white papers, and presentations to convey research insights succinctly, persuasively and in a timely manner. Engaging with stakeholders throughout the research conferences and symposia can also help bring the issues to the forefront and include them in the national agenda of discourse and dialogue.

In view of the plethora of policy gaps and wrong-headed policy implementation culture in the Maldives, researchers and academics can play a useful role in bringing to the attention of policymakers and the public issues that matter most. Strong advocacy and communication of policy implications through rigorous research and strong recommendations can be the way forward. Building a strong coalition of academics to amplify the voice of reason is urgently needed for more effective and equitable policy outcomes.

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# The Silver Lining of Rejection: Build Resilience Leading to Quality Publication

Dr Fazeela Ibrahim

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Manuscript rejections are a common aspect of the academic publication process. Though often perceived as a hindrance, they can provide invaluable opportunities for enhancement and professional development. This paper proposes approaches for handling manuscript rejections, reframing them as constructive experiences, and utilising the feedback obtained to bolster research endeavours and foster personal growth as a researcher.

## My Journey

While working on publishing my research, I faced numerous rejections that deeply shook my confidence and made me seriously question my abilities as a researcher. Despite the discouragement and self-doubt that these repeated rejections instilled, I persisted, meticulously addressing each reviewer's comments and tirelessly working to improve the quality of my manuscript. The setbacks and repeated failures often made me doubt the intrinsic value and significance of my work. Nevertheless, I remained steadfastly determined to see the process through. After four successive rejections, my paper was finally accepted by a SCOPUS-indexed journal on the fifth attempt. This arduous, often demoralising journey ultimately taught me invaluable, lessons about effectively handling rejection and reframing such setbacks as opportunities for personal and professional growth. I emerged from this experience with a more profound understanding of the nuances and complexities of the academic publication process, a strengthened sense of determination and resilience, and a renewed, heightened appreciation for the power of perseverance in the face of adversity.

Drawing upon my experience navigating the numerous challenges and obstacles posed by manuscript rejections and insights gleaned from relevant academic literature, I propose the following strategies to empower fellow researchers to proactively reframe these seemingly debilitating setbacks as invaluable opportunities for growth and development.

## Strategies to Empower Researchers

### 1. Leveraging Rejections

Academic journals frequently receive far more submissions than they can publish, often resulting in high rejection rates. These rejections may stem from a variety of factors, including a mismatch between the manuscript's content or focus and the journal's scope or priorities, methodological flaws or limitations in the research design that undermine the study's validity or reliability, insufficient novelty or originality compared to the existing body of scholarly work in the field, or the subjective preferences, biases, and preconceptions of the reviewers and editors tasked with evaluating the submission (Hesterman et al., 2018). Researchers must recognise that manuscript rejection often does not reflect the overall quality or capabilities of the researcher but is instead a common and inevitable part of the highly competitive academic publication process (Ali, 2021). Adopting this perspective can help alleviate the initial emotional impact of rejection, allowing researchers to move forward more constructively and resiliently by focusing on using the feedback received to improve their work and develop a thicker skin against the sting of rejection.

### 2. Adopting a Constructive Mindset

Manuscript rejections can trigger disappointment, frustration, and self-doubt. It is crucial to acknowledge and process these emotions and develop coping mechanisms to move forward productively (Argan et al., 2023). One author notes, "Rejections should be considered a normal part of a scientific career and used as a catalyst for growth" (Ali, 2021, p.2). Researchers can better manage the emotional toll and channel their energy into constructive actions by normalising rejection and viewing it as an inevitable part of the publication process. Instead of viewing manuscript rejections as failures, researchers should see them as opportunities for growth. Each rejection offers valuable feedback from reviewers, pinpointing strengths and weaknesses (Ali, 2021). This

constructive criticism is a precious resource, helping authors refine their manuscripts before submitting them to more suitable journals. Research shows that many initially rejected papers can be successfully published after revisions in better target journals (Khadilkar, 2018), underscoring the potential for improvement. Embracing this perspective turns rejections into pivotal moments of learning and development, enhancing researchers' skills and the quality of their work.

### 3. Developing a Resilient Mindset

Developing a resilient mindset is crucial when facing manuscript rejections. Instead of reacting with despair or hastily discarding rejection letters, researchers should approach them calmly and with a focus on solutions (Allen et al., 2022). Maintaining positivity and a commitment to improvement allows researchers to see rejections as valuable feedback rather than personal setbacks. They should view these rejections as opportunities to reflect on their work, identify areas for enhancement, and refine their writing and research skills. It is essential not to give up on writing altogether; often, through careful revisions or strategically targeting more suitable journals, initially rejected manuscripts can be successfully published (Ali, 2021). By thoughtfully integrating the feedback and constructive criticisms received from rejections, researchers can strengthen the quality and impact of their work, develop a thicker skin against the sting of rejection, and ultimately increase their chances of achieving that coveted publication milestone. Adopting this resilient, solutions-oriented mindset is vital to transforming what may initially feel like devastating setbacks into meaningful avenues for professional growth and advancement.

### 4. Fostering a Supportive Academic Environment

University faculty play a crucial role in cultivating a nurturing academic environment that embraces rejection as a natural and integral part of the growth and development process. Establishing robust mentorship programs is vital in offering guidance, emotional support, and practical wisdom to junior faculty members and graduate students navigating the challenges of academic publishing (Allen et al., 2022). Seasoned researchers who have weathered the storms of rejection can impart invaluable insights, sharing their personal

experiences and providing junior colleagues with practical strategies for effectively handling editorial feedback, refining their manuscripts, and persevering in the face of setbacks. Moreover, workshops and seminars that delve deeply into the intricacies of manuscript preparation, the nuances of peer review processes, and the cultivation of resilience-building skills can equip researchers at all career stages with the essential tools and mindsets required to navigate the complexities of the academic publishing landscape successfully (Liu, 2022). Fostering a departmental culture characterised by open communication, mutual understanding, and a genuine sense of community can go a long way in mitigating the feelings of isolation that often accompany the experience of rejection, empowering researchers to emerge from these challenges strengthened, not demoralised.

### Conclusion

Manuscript rejections, often seen as setbacks, can be transformed into opportunities for growth and development. By reframing rejections as catalysts for improvement, faculty can harness feedback, enhance their skills, and emerge as stronger, more resilient scholars. This mindset increases the likelihood of successful publication and fosters a lifelong commitment to continuous learning and professional advancement. Viewing the rejection process as a valuable learning experience is integral to academic success. By nurturing resilience, adaptability, and a growth mindset, researchers can confidently navigate the challenges of academic publishing. The journey from rejection to acceptance requires perseverance and dedication, leading to greater excellence in research and scholarship.

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## FROM THE WORLD OF RESEARCH

### Perceptions and detection of AI use in manuscript preparation for academic journals

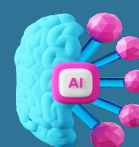
Nir Chemaya, Daniel Martin

#### Abstract

*The rapid advances in Generative AI tools have produced both excitement and worry about how AI will impact academic writing. However, little is known about what norms are emerging around AI use in manuscript preparation or how these norms might be enforced. We address both gaps in the literature by conducting a survey of 271 academics about whether it is necessary to report ChatGPT use in manuscript preparation and by running GPT-modified abstracts from 2,716 published papers through a leading AI detection software to see if these detectors can detect different AI uses in manuscript preparation. We find that most academics do not think that using ChatGPT to fix grammar needs to be reported, but detection software did not always draw this distinction, as abstracts for which GPT was used to fix grammar were often flagged as having a high chance of being written by AI. We also find disagreements among academics on whether more substantial use of ChatGPT to rewrite text needs to be reported, and these differences were related to perceptions of ethics, academic role, and English language background. Finally, we found little difference in their perceptions about reporting ChatGPT and research assistant help, but significant differences in reporting perceptions between these sources of assistance and paid proofreading and other AI assistant tools (Grammarly and Word). Our results suggest that there might be challenges in getting authors to report AI use in manuscript preparation because (i) there is not uniform agreement about what uses of AI should be reported and (ii) journals might have trouble enforcing nuanced reporting requirements using AI detection tools.*

All art is a kind  
of confession

-James Baldwin



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# Addressing SILOS in Modern Healthcare Systems: Strategies for Integration and Innovation

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## Introduction

In modern healthcare systems, the concept of SILOS refers to the organizational and operational barriers that arise from the compartmentalization of departments or specialities forming clusters within healthcare institutions (Bento, Tagliabue, & Lorenzo, 2020; Lau, Boesen, Richer, & Hill, 2024). In recent years, several organizations have implemented interventions to integrate work processes and bridge network clusters. Different assumptions about clusters often influence organizational settings. There are concerns about the formation of silos and structural barriers to communication across the formal and informal network structures. Conversely, network clusters are regarded as spaces of local social reinforcement from which innovation ideas may emerge (Bento, Tagliabue, & Lorenzo, 2020).

However, the SILOS mentality can manifest as barriers to effective communication, collaboration, and information sharing among healthcare professionals, which ultimately impacts patient care quality and organizational efficiency (Joao & Raquel, 2018). Additionally, the issue of SILOS in healthcare is pervasive and multifaceted. It tends to hinder operational efficiency, staff morale and patient satisfaction, leading to failure to enhance productivity and workplace culture. Historically, healthcare delivery has been structured around departmental or specialty-specific lines, with each unit operating independently to fulfil its specific responsibilities. While this specialization can promote deep expertise within each area, it often results in fragmented care delivery, disjointed workflows, and missed opportunities for holistic patient management (Peiris, et al., 2024).

Rigorous analysis through literature explains that one of the primary consequences of SILOS is the breakdown in communication among healthcare teams. For instance, clinicians in different departments may have limited opportunities to

exchange critical patient information, leading to misunderstandings, limited interdependencies, delays in treatment decisions, and potentially adverse patient outcomes. (Lau, Boesen, Richer, & Hill, 2024; Bento, Tagliabue, & Lorenzo, 2020) (Waal, Weaver, Day, & Heijden, 2019). When patients are transferred, it is vital to communicate necessary patient information from one unit to another. This lack of effective communication can be particularly pronounced during care transitions, such as patient handoffs between departments or shifts, where clear and concise information transfer is crucial. If not adhered to, it can lead to delays in diagnosis and treatment and even adverse events (Toren, Lipschuetz, Lehmann, Reger, & Arad, 2022).

When healthcare professionals operate within isolated silos, there is a risk of duplication of efforts, inefficiencies in resource utilization, and missed opportunities for shared learning and innovation; for example, a lack of collaboration between primary care providers and specialists may result in fragmented management of chronic conditions, leading to suboptimal health outcomes and increased healthcare costs. (Manning & Islam, 2023). Addressing SILOS in healthcare requires a strategic and systematic approach that emphasizes integration and teamwork across organizational boundaries. Several initiatives and strategies have been proposed to mitigate the impact of SILOS and promote a more cohesive healthcare delivery system (Zajac, Woods, Tannerbaum, Salas, & Holladay, 2021). One such approach is the implementation of interdisciplinary care teams, where professionals from different specialities collaborate closely to develop and implement comprehensive care plans for patients. These teams facilitate regular communication, coordination of care activities, and collective decision-making, thereby enhancing the continuity and quality of patient care (Bendowska & Baum, 2023).

Furthermore, healthcare organizations can

leverage technology and data systems to break down SILOS and facilitate seamless information exchange. Electronic health records (EHRs) and interoperable health information systems enable healthcare providers to access and share patient information across different departments and settings in real time (Enahoro, et al., 2023). According to Adeniyi et al. (2024), EHRs has revolutionized healthcare delivery as it can encompass an eclectic range of patient data (medical history, medications, allergies, laboratory results, treatment plans, and much more relevant to the patient). Therefore, by integrating these technologies into clinical workflows, healthcare teams can improve care coordination, reduce medical errors, and enhance patient safety.

Educational and training programs also play a crucial role in addressing SILOS by fostering a culture of collaboration and shared responsibility among healthcare professionals. For example, interprofessional education (IPE) initiatives bring together students and practitioners from various disciplines to learn, develop mutual respect, and understand each other's roles and contributions to patient care. (Bookey-Basset, Espin, Northwood, Jeffs, & Veerasuntharam, 2023). Effective teamwork is globally recognized as vital for creating a more efficient and patient-centred healthcare delivery system. An effective team is recognized as one whose members include shared values and decision-making - keeping patients at the center (Babiker, et al., 2014; Zajac, Woods, Tannenbaum, Salas, & Holladay, 2021).

However, despite all these efforts, the healthcare environment SILOS remains a complex and ongoing challenge in the healthcare environment. Leadership support, teamwork, effective communication, and organizational culture can pose significant barriers to proper integration and collaboration within healthcare organizations. Furthermore, the hierarchical nature and the entrenched professional identities in the healthcare systems may reinforce siloed behaviour and attitudes among healthcare professionals.

To conclude, addressing SILOS in healthcare

requires a didactic and innovative approach that comprehends organizational restructuring, technological innovation, educational reform, and cultural change. Strategic planning to overcome barriers to effective communication and collaboration in healthcare organizations can enhance patient outcomes and foster a patient safety culture with patient-centered care, improve operational efficiencies in policy development and implementation towards achieving the same goals, and implement evidence-based best practices to help achieve the full potential of integrated healthcare delivery.

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Man is affected not by  
events but the view he  
takes of them

Seneca



## FROM THE WORLD OF RESEARCH

### Automation, AI & Work

Laura D. Tyson, John Zysman

#### Abstract

*We characterize artificial intelligence as “routine-biased technological change on steroids,” adding intelligence to automation tools that substitute for humans in physical tasks and substituting for humans in routine and increasingly nonroutine cognitive tasks. We predict how AI will displace humans from existing tasks while increasing demand for humans in new tasks in both manufacturing and services. We also examine the effects of AI-enabled digital platforms on labor. Our conjecture is that AI will continue, even intensify, automation’s adverse effects on labor, including the polarization of employment, stagnant wage growth for middle-and low-skill workers, growing inequality, and a lack of good jobs. Though there likely will be enough jobs to keep pace with the slow growth of the labor supply in the advanced economies, we are skeptical that AI and ongoing automation will support the creation of enough good jobs. We doubt that the anticipated productivity and growth benefits of AI will be widely shared, predicting instead that they will fuel more inequality. Yet we are optimistic that interventions can mitigate or offset AI’s adverse effects on labor. Ultimately, how the benefits of intelligent automation tools are realized and shared depends not simply on their technological design but on the design of intelligent policies.*



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# Performance Management Deficiencies of SMEs Leading to Finance Issues

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## Research Background and Problem Statement

Small and Medium Enterprises (SMEs) are the backbone of many economies, driving innovation, creating employment, and contributing significantly to GDP. According to the World Bank, SMEs represent about 90% of businesses and more than 50% of employment worldwide. Despite their crucial role, SMEs face numerous challenges that threaten their sustainability and growth. Performance management deficiencies are among the most significant issues, often leading to financial problems.

Performance management is a systematic process aimed at improving organizational performance by developing the performance of individuals and teams. It involves setting clear goals, monitoring progress, providing feedback, and implementing necessary changes to enhance performance (Armstrong, 2009). Effective performance management is crucial for aligning employee activities with the strategic objectives of a company (De Waal, 2013). However, many SMEs struggle with implementing effective performance management systems due to limited financial resources, lack of expertise, and the informal nature of their operations (Biron et al., 2011).

A significant body of literature highlights the importance of performance management in achieving organizational success. Locke and Latham (2002) emphasize the necessity of setting specific, measurable, achievable, relevant, and time-bound (SMART) goals for guiding employee efforts and evaluating performance. However, SMEs often fail to establish such goals, leading to a lack of direction and motivation among employees (Doran, 1981). Additionally, SMEs frequently lack the systems and tools for effective performance monitoring, resulting in unnoticed performance issues and missed opportunities for enhancement (Merchant & Van der Stede, 2012).

## Aims and Objectives

The primary aim of this research is to investigate the performance management deficiencies in SMEs

and their impact on financial outcomes. The specific objectives are to identify common performance management deficiencies in SMEs, examine how these deficiencies contribute to financial problems in SMEs, and propose strategies for improving performance management practices in SMEs. The central research question guiding this study is: What are the common performance management deficiencies in SMEs, and how do they contribute to financial issues?

## Methodology

This research employs a mixed-methods approach, combining qualitative and quantitative data collection and analysis techniques.

## Data Collection

To collect data, a comprehensive literature review on performance management in SMEs will be conducted to identify common deficiencies and their potential financial impacts. Structured surveys will be administered to SME owners and managers to gather quantitative data on their performance management practices and financial outcomes. Additionally, in-depth interviews with selected SME owners and managers will provide qualitative insights into the challenges they face in performance management and the strategies they employ to address these challenges. The data analysis will involve quantitative analysis of survey data using statistical techniques to identify trends and correlations between performance management practices and financial outcomes. Interview transcripts will be analyzed thematically to identify common themes and patterns related to performance management deficiencies and their impacts.

## Findings

### Lack of Clear Objectives and Goals

Preliminary findings indicate that many SMEs fail to establish clear objectives and goals, often neglecting the SMART criteria (Specific, Measurable, Achievable, Relevant, Time-bound). Without well-defined targets, employees lack



direction and motivation. According to one survey respondent, "Our company has struggled with setting specific goals. It feels like we're always reacting to problems rather than working towards clear objectives." This lack of direction can lead to inconsistent performance and failure to meet business targets. The literature supports this finding, with Locke and Latham (2002) emphasizing that goal-setting is a critical motivational tool that significantly enhances employee performance.

### **Inadequate Performance Monitoring**

Many SMEs lack the systems and tools necessary for effective performance monitoring. This deficiency results in unnoticed performance issues, delayed feedback, and missed opportunities for improvement. One manager noted, "We don't have a formal system to track performance. Often, by the time we realize there's a problem, it's too late to correct it efficiently." Effective performance monitoring involves regular tracking of employee progress and identifying areas needing improvement, as highlighted by Merchant and Van der Stede (2017). Without such systems, SMEs cannot provide timely feedback or take corrective actions, leading to prolonged periods of inefficiency.

### **Insufficient Training and Development**

Training and development are vital components of performance management as they equip employees with the skills and knowledge needed to excel in their roles. However, many SMEs do not prioritize employee development due to budget constraints and the perception that it is not immediately beneficial. One interviewee mentioned, "Training programs are often seen as a luxury rather than a necessity. We end up with employees who aren't fully equipped to handle new challenges." This neglect can lead to skill gaps, decreased productivity, and higher turnover rates. Noe, Clarke, and Klein (2014) argue that continuous learning opportunities are crucial for maintaining a competitive edge and fostering innovation within organizations.

### **Poor Communication and Feedback**

Effective communication and feedback are essential for fostering a productive work

environment and improving employee performance. SMEs often suffer from poor communication practices, with feedback being sporadic, non-specific, or overly critical. An employee remarked, "Feedback here is inconsistent. Sometimes it's too harsh, and other times, there's no feedback at all." This can demoralize employees and lead to disengagement and decreased performance. Luthans and Stajkovic (1999) highlight that constructive feedback and positive reinforcement are key to maintaining high levels of employee motivation and engagement.

### **Lack of Formal Performance Appraisal Systems**

Many SMEs operate without formal performance appraisal systems, relying instead on informal and subjective assessments. This can result in biased evaluations, lack of accountability, and missed opportunities for recognizing and rewarding high performance. A business owner admitted, "We've never had a formal appraisal system. Performance reviews are based on gut feelings rather than structured criteria." Formal performance appraisals help ensure that employee evaluations are systematic, fair, and aligned with organizational goals (DeNisi & Smith, 2014). The absence of such systems can lead to inconsistencies in performance evaluations and reduced employee morale.

### **Conclusions**

Performance management deficiencies are a significant challenge for SMEs, contributing to financial issues by reducing productivity, increasing employee turnover, and causing poor decision-making. Addressing these deficiencies through clear goal setting, effective performance monitoring, prioritizing training and development, enhancing communication, and implementing formal performance appraisal systems can improve the financial health and overall performance of SMEs.

The proposed strategies for improving performance management practices in SMEs include:

1. **Establishing Clear Objectives and Goals:** SMEs should prioritize setting SMART goals to provide direction and motivation for employees.
2. **Implementing Effective Performance Monitoring Systems:** Investing in performance monitoring

tools and systems can help SMEs track employee progress and identify areas for improvement.

3. **Prioritizing Training and Development:** Allocating resources for employee training and development can yield significant long-term benefits for SMEs.
4. **Enhancing Communication and Feedback:** Improving communication and feedback mechanisms can foster a more positive work environment and enhance employee performance.
5. **Implementing Formal Performance Appraisal Systems:** Adopting formal performance appraisal systems can help SMEs ensure that employee evaluations are fair, systematic, and aligned with organizational goals.

By addressing performance management deficiencies, SMEs can improve their financial outcomes and ensure long-term sustainability and growth.

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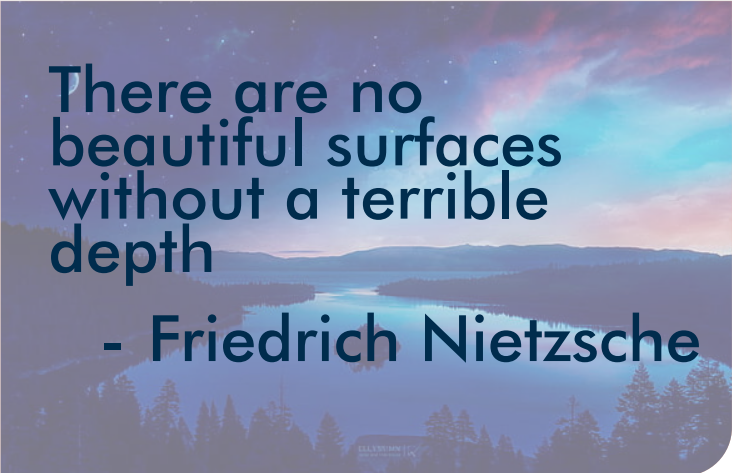
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There are no  
beautiful surfaces  
without a terrible  
depth

- Friedrich Nietzsche

# 3D Printing: Revolutionizing Academic Research and Education

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## Introduction

Additive manufacturing, more commonly known as Three-dimensional (3D) printing, has quickly become a transformative technology across various industries. In academia especially, it has become an invaluable medium for learning, teaching, and research. This article will explore the various applications and impact of 3D printing, and its potential to revolutionize education and science.

## Enhancing Education

3D printing serves as a powerful tool across various educational disciplines. In science, technology, engineering, and mathematics (STEM) fields, it provides students with a more hands-on experience in designing and manufacturing, as well as problem solving. For example, chemistry students can print molecular models to better understand complex structures, while students in physics can create custom apparatus for experiments (Novak & Wisdom, 2018). Students familiar with 3D printing will be better prepared for future careers in fields where 3D printing is increasingly prevalent, such as engineering, medicine, and advanced manufacturing.

Similarly, in medical education, 3D-printed anatomical models provide students with realistic and more comprehensible learning experiences. These models can replicate specific pathologies or rare conditions, offering invaluable training opportunities that were previously difficult to attain (McMenamin et al., 2021). The ability to create custom tools and models allows access to high-quality educational materials, potentially leveling the playing field for institutions with limited resources. Hence, significantly bridging the gap between theoretical knowledge and practical application in a classroom.

3D printing also promotes inclusive education by creating tactile learning materials for differently

abled students. For example, 3D-printed maps, diagrams, and models allow visually impaired students to engage with complex concepts through touch, thereby enhancing their learning experience (I et al., 2016). By leveling the playing field, students with diverse needs are provided access to engage with complex concepts on par with their peers. The ability to create custom, tactile learning aids quickly and cost-effectively, could transform how we approach special education and accessibility in schools and universities. Furthermore, this inclusive approach may foster greater empathy and understanding among all students, contributing to a more inclusive society overall.

This integration of 3D printing into STEM education has far-reaching implications for the future of learning and innovation. Ultimately, creating a new generation of innovators who are adept at turning abstract ideas into tangible solutions, driving progress across various scientific and technological fields.

## Applications in Research

3D printing has achieved new avenues for research across multiple disciplines. Biologists use bioprinting to create tissue-like structures for drug testing and regenerative medicine studies (Mirshafiei et al., 2024). This technology allows for the precise placement of cells and biomaterials, enabling the creation of complex, three-dimensional tissue models.

In archaeology and anthropology, 3D printing is utilized to replicate and study ancient artifacts. Researchers can create exact replicas of fragile or rare relics, allowing for hands-on examination without risking damage to the original (Pavelka et al., 2015). This application extends to paleontology as well, where 3D printed fossils enable paleontologists to study and manipulate specimens that would otherwise be too delicate to handle.

Many engineering departments around the world have embraced 3D printing for rapid prototyping and testing of designs. This allows students and researchers to quickly test on their ideas, reducing the time and cost associated with traditional manufacturing methods (Stern et al., 2017). This ability to reproduce complex geometries that are difficult or impossible to create with conventional techniques, has also opened up new possibilities in fields such as aerospace and biomedical engineering.

### Environmental Applications

3D printing has found innovative applications in environmental science and ecology. Researchers use the technology to create artificial coral reefs, with the aim of helping and restore damaged marine ecosystems (Matus et al., 2021). These 3D-printed structures provide a rich structure for coral growth and habitat for marine life, offering a potential solution to coral reef degradation.

3D printing also contributes to sustainability efforts in academia. By enabling on-demand production of lab equipment and educational materials, it reduces waste and transportation-related emissions. Additionally, some institutions are also exploring the use of recycled plastics as 3D printing materials, by turning waste into valuable resources for academic projects (Baechler et al., 2013).

### Challenges and Future Directions

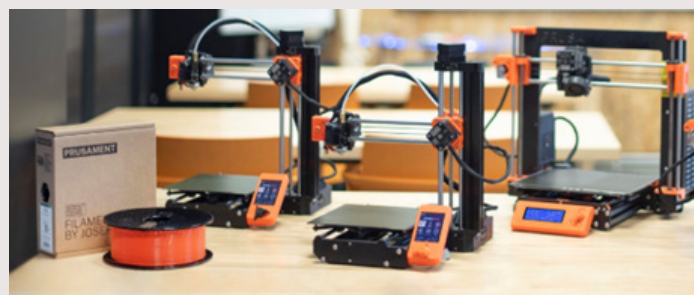
The integration of 3D printing in academia, despite its many benefits, faces its challenges. The initial cost of equipment and materials can prove to be restrictive for some institutions. Additionally, the steep learning curve associated with 3D design software and printer operation, requiring further investment in training for both faculty and students (Novak & Wisdom, 2018).

Having stated that, the potential for 3D printing in academia remains undeniable and continues to expand. Advancements in materials science are broadening the range of printable substances, including conductive materials and sustainable, bio-compatible polymers. This progress is likely to

lead to new applications in many industries, such as electronics and regenerative medicine.

### Conclusion

3D printing has become an influential tool in academia, revolutionizing research methodologies, enhancing educational experiences, and opening new avenues for environmental sustainability projects. As the technology continues to evolve, its integration into academic settings becomes vital, fostering innovation, interdisciplinary collaboration, and hands-on learning. While challenges remain, the transformative potential of 3D printing in academia is clear and promising, as it shapes the future of education and research across multiple disciplines.



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## FROM THE WORLD OF RESEARCH

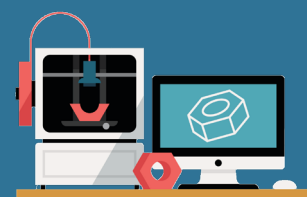
### 3D Concrete Printed Houses: Barriers to Adoption and Construction Practices

John B. Peavey, Ed Hudson, Zachary A. Summy, Jon Violette

#### Abstract

*Home Innovation Research Labs (Home Innovation) was tasked by the U.S. Department of Housing and Urban Development (HUD) to explore the integration of 3D concrete printing (3DCP) technology in residential buildings. Most research in this area has focused on standardizing the equipment design, manufacturing process, and material formulation, which is critical to developing design techniques and performance criteria within the building code (Buswell et al., in press). To complement the current 3DCP research, this project investigates two key critical construction issues: (1) identify barriers to the adoption of 3DCP technology (such as the lack of building codes or standards, the lack of design and construction guidance, and the lack of technical expertise to implement the new technology) and (2) system integration—evaluate how 3DCP components (primarily walls) will be installed with conventional building product components. Home Innovation is conducting qualitative research among home builders and contractors to understand the challenges and opportunities to accelerate the adoption of 3DCP technology. In addition, Home Innovation has evaluated the construction of 3DCP residential buildings in the field with close attention to (1) installation of windows and doors, (2) wall penetration methods for installing utilities (primarily plumbing and electrical), (3) wall connections between the roof and foundation, and (4) interior and exterior wall finishing options. The project is in process, and the data presented in this article are preliminary.*

Creativity is contagious,  
pass it on  
- Albert Einstein



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## FROM THE WORLD OF RESEARCH

### Understanding cybercrime's impact on women's physical and psychological well-being

*Thenmozhi Pandian, Neelamalar Maraimalai*

#### Abstract

*This study examines how cybercrimes impact women's well-being in digital spaces, focusing on online harassment, cyberbullying, misinformation, and non-consensual exposure to explicit content. Survey data from 200 respondents show concerning trends: 102 experienced online harassment, 63 encountered false health information, 47 were approached to sexting, and 28 were exposed to pornography without consent. Qualitative insights highlight emotional distress. Urgent actions include awareness-raising, education, and tailored support networks. These findings underscore the need to combat cybercrimes and empower women online.*



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