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RESEARCH DIGEST

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The Critical Role of Construct Validity in Research Design

Dr Ahmed Shahid, Editor

In my interactions with research students over the years, I notice that a large number of them develop their own research instruments often unaware or neglective of some fundamental requirements that should ensure the validity and reliability of the data they collect through such instruments. While there are multiple forms of validity such as content validity, criterion validity, face validity, external validity, internal validity, concurrent validity, in this editorial, I will focus on construct validity as this relates to measuring whether the test or the instrument measures the concept that it intends to measure.

Construct validity addresses whether your measurements actually capture the theoretical concept you're trying to research and study. For example, if you're researching "employee satisfaction," are your survey questions really measuring satisfaction, or are they accidentally measuring something else like company loyalty? If you are trying to measure "student learning achievement", does your instrument capture the learning achievement in a non-ambiguous manner that can inform your research objective? In my opinion, construct validity is all the more relevant and essential when the core phenomenon of the research is built around a subjective or inter-subjective reality such as motivation, job satisfaction, work-life balance, etc. which are harder to measure. Obviously, this requirement also applies equally well in relation to an objective phenomenon as well.

Regardless of the topic area, construct validity of the instrument is a necessary condition for the overall validity or appropriateness of the research methodology. Without proper construct validity, even perfect data collection and analysis become meaningless. Therefore, in order to ensure construct validity of the instrument, careful theoretical groundwork must be completed before any data collection begins, whether the research is based on quantitative and qualitative methods.

The first step in building a robust instrument is to start by conducting a comprehensive literature review which captures how other researchers have defined and measured the construct that you are interested in, which can then be linked with the relevant underlying theoretical frameworks. If the construct is already being used by other researchers through established instruments, it may be a good idea to adopt or adapt them in a manner that preserves the construct and structure of the instrument. It is also essential to create clear and precise theoretical definitions of the construct and establish its boundaries and scope. This will help in linking the theoretical components and measurement items. Finally, pilot testing the instrument with an eye on identifying theoretical gaps and ambiguities will also be helpful in strengthening the construct validity of your research instrument. This will also allow necessary fine-tuning before the instrument is deployed in the field.

Finally, ensuring validity and reliability requires not only a thorough understanding of their different manifestations, but an open mind to ensure the rigour of the entire research process.

In this Issue

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Practices around IWBs and the Lack of Progress Beyond Stage 3 based on Sweeney's (2008) Framework

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Introduction

Interactive Whiteboards (IWBs) have been widely introduced into classrooms as tools with the potential to transform pedagogy, fostering greater student engagement and participation. However, despite their increasing presence in educational settings, research suggests that their integration into interactive teaching has been uneven and limited (Beauchamp & Kennewell, 2013 and Latheef, 2022). Sweeney's (2008) framework categorizes IWB use into five stages, ranging from basic use as a projection tool (Stage 1) to full pedagogical integration, where technology becomes an invisible but integral part of the learning experience (Stage 5). Despite these expectations, no teacher has been observed reaching Stage 5, and most remain within Stages 1-3. This essay explores the reasons behind this stagnation by comparing and contrasting the observed practices around IWBs in a current study and aligning them with Sweeney's framework. The analysis will highlight key barriers to progress, including teachers' perceptions, professional development gaps, curriculum constraints, technical challenges, and pedagogical limitations.

Sweeney's (2008) Interactivity Stages

Sweeney (2008) proposed five distinct stages of IWB integration in classroom teaching:

1. **Stage 1 - Whiteboard Replacement:** The IWB is used as a substitute for a traditional whiteboard, primarily for projection and teacher-led instruction.
2. **Stage 2 - Support Didactic:** Teachers incorporate basic IWB functions, such as annotations and simple interactive elements, while still maintaining a teacher-centered approach.
3. **Stage 3 - Interactive:** The IWB is used in a more dynamic manner, involving some student interaction and a variety of multimedia resources to enhance engagement.
4. **Stage 4 - Enhanced Interactive:** IWBs are integratewith other digital tools, and students take a more active role in their learning, using technology for collaborative and independent tasks.
5. **Stage 5 - Synergistic User:** IWBs become seamlessly embedded into teaching and learning, with technology use becoming an invisible yet essential component of pedagogy.

Despite these stages, no observed teacher has achieved Stage 5, and few move beyond Stage 3. The following sections explore the reasons behind this phenomenon.

Comparison of IWB Practices in the PhD Study and Sweeney's Framework

A current research project examined IWB use in primary classrooms, identifying patterns of interactivity in teaching and learning (Latheef, (2022). The findings revealed that most teachers remained in Stages 1-3, with only limited instances of Stage 4 interactivity. The study highlighted the following patterns:

Stage 1 - Whiteboard Replacement

Many teachers used IWBs as a high-tech version of a traditional whiteboard, displaying content without interactive engagement. These classrooms relied on the IWB for static presentations, PowerPoint slides, and direct instruction. Teachers controlled the board, with little to no student interaction. This practice reflects limited technological integration, as the IWB functioned merely as a presentation tool rather than an interactive device.

Stage 2 - Support Didactic

Some teachers moved slightly beyond Stage 1 by incorporating basic IWB functions such as highlighting, underlining, and annotating text during instruction. However, the structure of lessons remained largely teacher-centered. While students occasionally engaged with the board (e.g., dragging and dropping answers in quizzes), the interactions were often pre-structured and lacked depth. This stage showed that while IWBs were being utilized beyond mere projection, their full interactive potential remained untapped.

Stage 3 - Interactive

Teachers operating at Stage 3 made use of a broader range of IWB functions, incorporating multimedia elements, digital quizzes, and interactive games. These activities encouraged some level of student participation, but the teacher still maintained primary control. Students had opportunities to interact with the board but only within predefined parameters set by the teacher. This stage demonstrated progress in IWB use but remained limited in fostering higher-order thinking and independent learning.

Why Stages 4 and 5 Were Not Achieved

While a few observed teaching episodes contained elements of Stage 4 interactivity, none fully met its criteria. The barriers preventing teachers from progressing beyond Stage 3 included:

1. **Teacher Perceptions and Confidence**
    - Many teachers perceived IWBs as tools to enhance their existing instructional methods rather than as transformative learning devices.
    - Some lacked confidence in using advanced IWB features and preferred traditional methods, limiting their willingness to experiment with interactive learning approaches.
2. **Lack of Professional Development**
    - Teachers received initial technical training but lacked ongoing professional development focused on pedagogical strategies for interactive learning.
    - Without structured guidance, many teachers defaulted to didactic teaching styles, using IWBs primarily for content delivery rather than interactive engagement.
3. **Curriculum Constraints and Assessment Pressures**
    - Teachers were often constrained by rigid curricula that prioritized content coverage over interactive learning.
    - Standardized assessments emphasized rote learning and factual recall, discouraging teachers from experimenting with student-driven, technology-enhanced inquiry.
4. **Technical Challenges and Infrastructure Limitations**
    - Inconsistent internet connectivity, software issues, and hardware malfunctions discouraged teachers from fully integrating IWBs into their pedagogy.
    - Restrictions on external web resources and school IT policies further limited teachers' ability to incorporate diverse digital tools.
5. **Classroom Management and Pedagogical Challenges**
    - Teachers were hesitant to allow students greater control over the IWB due to concerns about classroom management and maintaining lesson structure.
    - Student-led learning requires different pedagogical approaches, which some teachers were unfamiliar with or found challenging to implement.

Implications for Future Practice

To support teachers in advancing beyond Stage 3, several key strategies should be considered:

1. **Enhanced Professional Development**
    - Training should go beyond technical skills to include pedagogical strategies for fostering interactive and student-centered learning.
    - Hands-on workshops and collaborative learning communities could help teachers build confidence in using IWBs dynamically.
2. **Curriculum Flexibility**
    - Educational policymakers should allow for greater flexibility in curriculum design to encourage interactive and inquiry-based learning.
    - Assessments should incorporate measures of student engagement and interactive learning processes rather than focusing solely on content knowledge.
3. **Improved Technical Support and Infrastructure**
    - Schools should invest in reliable internet connections, updated software, and accessible digital resources.
    - IT departments should work closely with educators to provide timely troubleshooting and technical support.
4. **Encouraging Student-Led Interactivity**

- Teachers should be supported in designing lessons where students take an active role in using the IWB, fostering independent and collaborative learning.
- Strategies such as flipped classrooms, problem-based learning, and digital storytelling can help integrate IWBs into more interactive pedagogies.

5. Changing Teacher Perceptions

- Schools should promote a culture where IWBs are seen as dynamic tools for enhancing learning rather than merely as presentation aids.
- Peer mentoring programs could help less confident teachers learn from colleagues who successfully use IWBs interactively.

Conclusion

The analysis of IWB practices in the current study confirms that teachers primarily operate within the first three stages of Sweeney's (2008) interactivity framework. A combination of teacher perceptions, professional development gaps, curriculum constraints, technical limitations, and pedagogical challenges prevents movement beyond Stage 3. No teacher has achieved Stage 5 because the conditions necessary for seamless, student-driven, and technology-integrated learning are not yet in place. Addressing these barriers requires systemic changes in teacher training, curriculum flexibility, and support structures to ensure IWBs fulfill their potential as transformative educational tools.

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FROM THE WORLD OF RESEARCH

Sparse personalized federated class-incremental learning

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Abstract

The Recently federated learning (FL) has attracted growing attention by performing data-private collaborative training on decentralized clients. However, the majority of existing FL methods concentrate on single-task scenarios with static data. In real-world scenarios, local clients usually continuously collect new classes from the data stream and have just a small amount of memory to store training samples of old classes. Using single-task models directly will lead to significant catastrophic forgetting in old classes. In addition, there are some typical challenges in FL scenarios, such as computation and communication overhead, data heterogeneity, etc. To comprehensively describe these challenges, we propose a new Personalized Federated Class-Incremental Learning (PFCIL) problem. Furthermore, we propose an innovative Sparse Personalized Federated Class-Incremental Learning (SpaPFCIL) framework that learns a personalized class-incremental model for each client through sparse training to solve this problem. Unlike most knowledge distillation-based methods, our framework does not require additional data to assist. Specifically, to tackle catastrophic forgetting brought by class-incremental tasks, we utilize expandable class-incremental models instead of single-task models. For typical challenges in FL, we use dynamic sparse training to customize sparse local models on clients. It alleviates the negative effects of data heterogeneity and over-parameterization. Our framework outperforms state-of-the-art methods in terms of average accuracy on representative benchmark datasets by 3.3% to 43.6%.

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Theoretical and Conceptual Frameworks: Blueprints for Conducting Research

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Frameworks in research play a crucial role in shaping the direction of a research project. A strong framework helps you to connect your research to what is already known. Essentially, a robust framework links your research to current knowledge by carefully assessing existing literature, pinpointing gaps or unanswered questions, and placing your work within that context (Luft et al., 2022). In short, a framework serves as the structure and helps the researcher align the methodology with the theories or concepts relavant to the rationale of the study.

Research frameworks are mainly of two types, theoretical framework and conceptual framework. Theoretical frameworks, and conceptual frameworks are critical elements of research, representing distinct components within research design, however they are often used interchangeably and is quite confusing for many researchers. According to Luft et al. (2022), theoretical frameworks offer a way to explain and interpret the studied phenomenon, while conceptual frameworks clarify assumptions about the studied phenomenon. Thus, the choice of choosing the right framework depends on the research objectives, the nature of the study, and the existing literature. Since students find the concepts theory, theoretical framework, and conceptual framework quite difficult, it is crucial to give time to understand these concepts.

Concept vs. theory

Making the exact distinction between concepts and theories may be difficult. While a concept is known as a formally developed idea, a theory is a set of concepts that is used to explain a phenomenon (Ngulube, Mathipa, & Gumbo, 2015). When concepts are organized and interrelated, they are considered as theories.

Theory is one of the major pillars of research. It is a set of propositions, that expresses the logical relations between or among different constructs and propositions (Kerlinger, 1986). As Varpio et al (2020) observe, a theory is an abstract, describing the relationship between concepts, which can be strengthened with data. Kivunja (2018) claims that ideas, concepts, and themes together comprise the theory and involves a lengthy process of research based on deductive and inductive analysis of the data. Theories are established and validated by experiments and evidence.

Conceptual frameworks

A conceptual framework in research refers to a structure that describes the researcher's understanding of the factors and variables relevant to the study and their relationships to one another. The purpose of a conceptual framework is to clarify the assumed relationships between the concepts under study and articulating them using pertinent literature (Luft et al., 2022). Ravitch and Riggan (2017) claim that conceptual frameworks are particularly useful for structuring qualitative or exploratory research, as they help clarify the core concepts and provide a visual or theoretical model to navigate complex relationships. Moreover, conceptual frameworks assist in narrowing the focus of the research, as well as identifying gaps in the existing literature (Maxwell, 2013).

Researchers create conceptual frameworks by reviewing relevant theories, models, and prior studies. It consists of your own insights regarding the various components of your research. A key strength of a conceptual framework is its ability to illustrate complex phenomena in an organized way. The visual representation can also help convey the research design to other stakeholders, such as advisors or funding bodies, making the research more accessible and transparent.

Theoretical framework

A researcher uses a theoretical framework when they are using a pre-established theory for their study. It is one of the most important aspects in the research process. However, the theoretical framework can also be a component that can come across as quite ambiguous due to its nature.

Grant and Osanloo (2015) describe a theoretical framework as the "blueprint" of a research. It is constructed logically connecting definitions, concepts and well-established theory or theories that supports one's study. The theoretical framework influences the types of questions asked, guides the

methodology and informs the discussion of the results of the study (Luft et al., 2022). It supports a theory of a research study and is a synthesis of the thoughts and findings of the leaders in one's field of research. In order to have a scholarly foundation for making sense of your data, it is critical to develop a theoretical framework.

Theoretical frameworks are normally used in quantitative research and are developed before data collection. However, they may be developed in a qualitative study as well, though in the data analysis phase (Grant & Osanloo, 2015). The theoretical framework demonstrates how a researcher utilizes and integrates a theory within their research setting, offering clarity and direction for the design and analysis of the study.

Researchers are able to gain knowledge about theories in their field by engaging with literature. This allows them to choose a theory which can guide their work accurately (Ngulube, Mathipa, & Gumbo, 2015). As advised by Grant and Osanloo (2015) the theoretical framework for a study must be identified at the beginning as it effects every decision made in the research. Consequently, when a theory is not applied, researchers risk the possibility of failing to raise and examine theoretically grounded questions and may generate findings of a narrow or limited value.

Concluding Thoughts

Both conceptual and theoretical frameworks are crucial for ensuring that research remains focused and relevant. While a theoretical framework connects the study to the existing theories and offer a way to explain and interpret the studied phenomenon, the conceptual framework enables researchers to clearly describe their understanding of the relationships among the compo¬nents of the phenomenon under study. Moreover, a theoretical framework is derived from the existing theoretical literature, whereas a conceptual framework is much broader and encompasses all aspects of a research. The integration of both frameworks is often necessary for conducting rigorous and meaningful research, as they support the development of hypotheses, data collection methods, and interpretation of findings.

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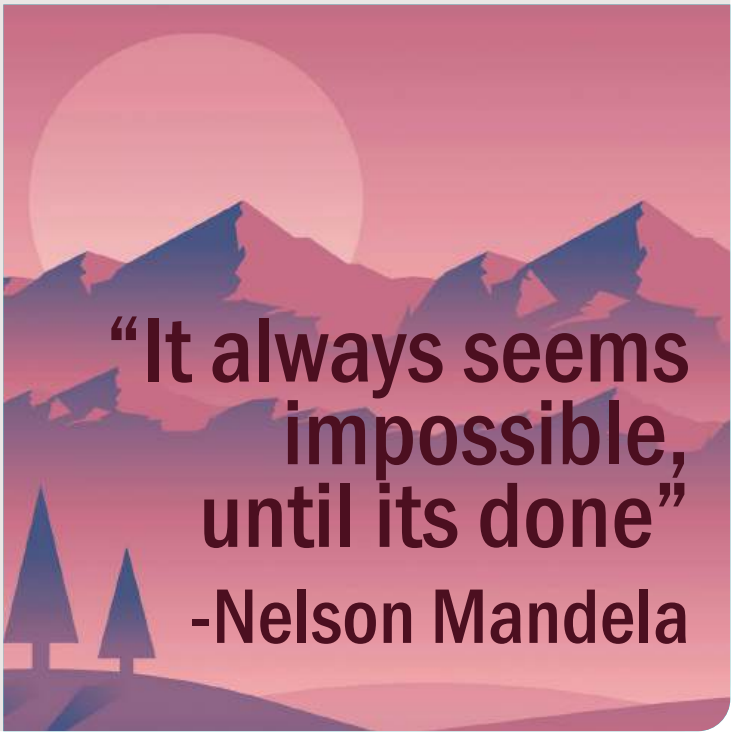

FROM THE WORLD OF RESEARCH

Knowledge graph representation learning: A comprehensive and experimental overview

Dorsaf Sellami, Wissem Inoubli, Imed Riadh Farah, Sabeur Aridhi

Abstract

Knowledge graph embedding (KGE) is a hot topic in the field of Knowledge graphs (KG). It aims to transform KG entities and relations into vector representations, facilitating their manipulation in various application tasks and real-world scenarios. So far, numerous models have been developed in KGE to perform KG embedding. However, several challenges must be addressed when designing effective KGE models. The most discussed challenges in the literature include scalability (KGs contain millions of entities and relations), incompleteness (missing links), the complexity of relations (symmetries, inversion, composition, etc.), and the sparsity of some entities and relations. The purpose of this paper is to provide a comprehensive overview of KGE models. We begin with a theoretical analysis and comparison of the existing methods proposed so far for generating KGE, which we have classified into four categories. We then conducted experiments using four benchmark datasets to compare the efficacy, efficiency, inductiveness, the electricity and the CO_2 emission of five state-of-the-art methods in the link prediction task, providing a comprehensive analysis of the most commonly used benchmarks in the literature.

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Characterization of Waste Glass Powder for Geopolymer Binder Applications

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Research Background and Problem Statement

Waste glass is a growing environmental concern due to its non-biodegradable nature, with millions of tons accumulating in landfills annually. Managing this waste is further complicated by limited recycling rates globally, particularly in regions like India and China (Manikandan & Vasugi, 2021; Zeybek et al., 2022). Additionally, the cement industry's significant carbon footprint, contributing to 7-8% of global CO2 emissions, highlights the need for sustainable alternatives (Manikandan, Natrayan, et al., 2022; Prem Kumar & Vasugi, 2024). Geopolymers offer a promising solution by utilizing waste materials rich in silica and alumina, such as waste glass powder (WGP) (Manikandan, Selija, et al., 2022). However, challenges remain in optimizing WGP usage as a precursor in geopolymer binders while ensuring economic and practical feasibility. This study aims to evaluate the potential of WGP as a sustainable geopolymer binder by analyzing its physical, chemical, mineralogical, and morphological characteristics, contributing to improved waste utilization in construction materials while addressing environmental concerns.

Research Hypothesis

Figure 1 illustrates the quantities of waste glass reprocessed (in tons) across various countries, highlighting the global scale of the waste glass problem and the disparities in recycling efforts. It is evident that countries with lower recycling rates require improved waste management strategies. Effective glass waste recycling programs can help minimize landfill waste, reduce environmental pollution, and promote sustainable glass waste management on a global scale (Kumar & Vasugi, 2023; Lee et al., 2018; Liu et al., 2019; Wang et al., 2018) . It is hypothesized that utilizing WGP as a primary precursor in geopolymer binders can enhance sustainability in the construction industry by mitigating landfill accumulation and CO_2 emissions while maintaining or improving mechanical and durability properties (Chandran, N Subhash. Manikandan et al., 2024; Manikandan & Vasugi, 2022).**cal and chemical characteristics of WGP**

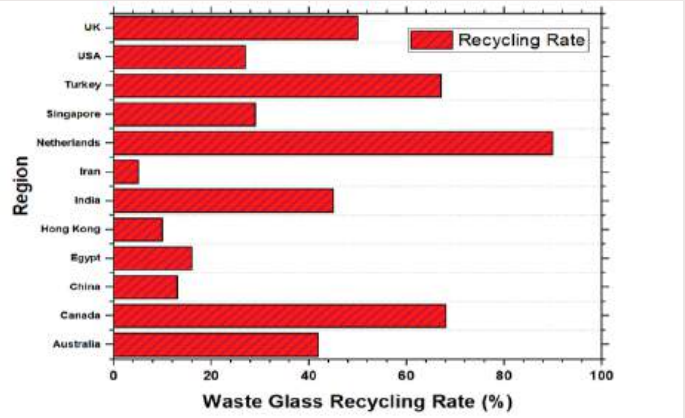

Fig. 1. WGP recycling rate across globe (Manikandan et al., 2025)

WGP, derived from processed waste glass rather than raw glass, is a by-product of the glass recycling process. It is a fine, dry powder that is typically made up of silica, alumina, and other minor elements. WGP has been shown to have potential as a sustainable geopolymer binder. The oxide composition of the raw WGP was analyzed using XRF analysis, and the results are presented in Table 1. In addition to XRF analysis, the details of the physical properties of WGP are also included in Table 1. The XRF analysis revealed that the primary component of WGP was 85.45% amorphous SiO2, which plays a crucial role in its pozzolanic behaviour.

Mineralogical Characteristics of WGP

Table 1 Physical and chemical characteristics of WGP

Oxide composition and other properties	Proportion
SiO_2	85.45%
Al_2O_3	3.08%
CaO	9.49%
Fe_2O_3	0.34%
Loss on ignition	0.23%
Color	White
Specific gravity	2.61
Specific surface area (m^2/kg)	1061

The XRD pattern of the WGP in fig. 2 does not show any peaks, indicating that the WGP has an amorphous structure. XRD analysis indicates that WGP is predominantly amorphous, with no significant crystalline peaks, essential for its

dissolution and reaction in geopolymer systems (Manikandan & Vasugi, 2022a).

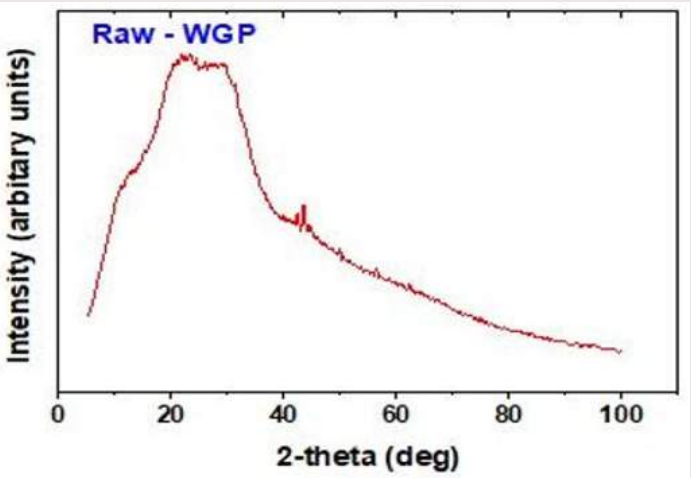

Fig. 2. XRD pattern of WGP sample

Morphological Characteristics of WGP

The SEM image shown in fig. 3 reveals that the WGP comprises irregular and angular particles with well-defined edges. These unique characteristics are responsible for the WGP rapid dissolution in alkaline medium and its ability to act as a rich source of silica in alkali-activated binders (Saribiyik et al., 2013). The irregular and angular shape of the WGP particles can be attributed to the recycling process, which causes the glass to break down into small, irregularly-shaped fragments. These features of the WGP make it an excellent candidate for use in alkali-activated binders, which require a high concentration of silica and other reactive components to harden and set.

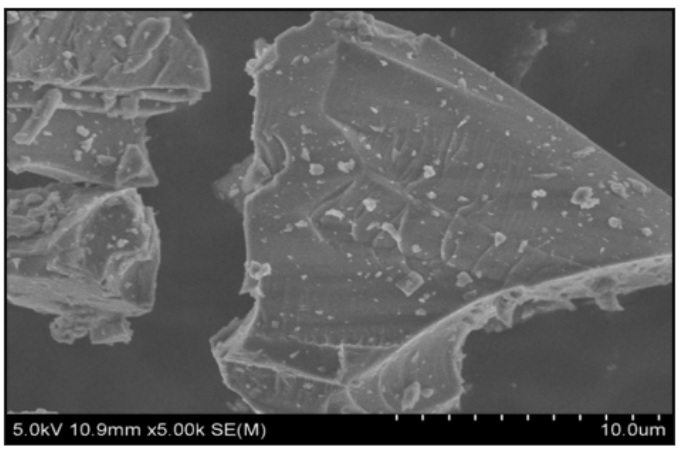

Fig. 3. SEM image of raw WGP sample

Conclusions

This study demonstrates that WGP powder is a viable and sustainable precursor for geopolymer binder production. Its physical, chemical, mineralogical, and morphological characteristics make it highly suitable for alkali-activated systems, ensuring effective dissolution and reaction with alkaline activators. The incorporation of WGP in geopolymer binders not only reduces landfill waste and CO_2 emissions but also enhances mechanical strength, durability, and long-term performance. By leveraging these unique properties, WGP-based geopolymers can serve as an eco-friendly alternative to traditional cement, contributing to sustainable construction practices while addressing the environmental challenges of glass waste disposal.

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FROM THE WORLD OF RESEARCH

The female finance penalty: Why are women less successful in academic finance than related fields?

Chris Brooks, Lisa Schopohl, Ran Tao, James Walker, Millie Zhu

Abstract

We study the publication patterns of male and female finance scholars, contrasting them with their counterparts in the related fields of accounting, economics and general management by analysing a large sample of more than 400,000 journal outputs spanning over two decades. We show that, in particularly stark contrast to accounting and management publications, women are vastly under-represented as authors of finance ones. Further, our results demonstrate that work produced by female finance academics is published in lower-rated journals and garners fewer citations, a phenomenon we refer to as the 'female finance penalty'. We find that the topics on which women in academic finance work and the methodological approaches they use are highly associated with this penalty. In particular, we show that female finance authors are more likely to engage in interdisciplinary and qualitative work, and to investigate topics that are linked with lower research success. Moreover, when it comes to journal placement, we find that female-authored work in finance is 'penalised' more for its interdisciplinarity than that authored by men. Finally, we show that female finance authors are less likely to be affiliated to US-based or highly ranked institutions – factors that typically increase both publication success and future citation – and when they are, there is some evidence that their citation rates are less likely to benefit from these affiliations than those of their male colleagues.

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Regulatory Challenges of Local Contents Requirement in the Nigerian Telecommunications Industry

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Introduction

Local content refers to the value-added or percentage of locally produced goods, services, and expertise used in an industry or project (Nigerian Content Development and Monitoring Board, 2024; NCC,2013). This study adopts a doctrinal method to analyse the regulatory challenges of local content requirement in the Nigerian telecommunications industry

Regulatory frameworks for lcoal content in the telecommunication industry

Nigerian Communications Act (NCA)

The Nigerian Communications Act is the primary legislation governing the telecommunications industry in Nigeria. It establishes the Nigerian Communications Commission (NCC) as a regulato saddled with the responsibility of enforcing the Act and its objectives via the statutory functions of the Commission (NCA, section 4).

National Information Technology Development Agency (NITDA) Act

After establishing the National Information Technology Policy in March 2001, the Federal Government established the National Information Technology Development Agency (NITDA) in March 2001. The agency can create a framework for the adoption of and setting the standards for local content in the telecommunications industry.

The Guidelines for Nigerian Content Development in ICT

The National Information Technology Development Agency (NITDA) created the Guidelines for Nigerian Content Development in December 2013. These Guidelines aim at enabling the local ICT Industry to contribute towards the achievement of National Development plans, initiatives and targets and stimulate and increase the development, production, sales and consumption of high-quality ICT products and services developed by indigenous companies.

Local Content Obligations of Telecommunications Companies

The Guidelines mandate that telecommunications/ICT companies devise a plan for local content by,inter alia, creating job opportunities and advancing indigenous expertise (The Guidelines, para 10).

Challenges of implementing local content regulations in the Nigerian telecommunications industry

A major challenge is lack of infrastructure sharing that is "the joint use of network facilities by two or more operators subject to an agreement specifying relevant technical and commercial conditions"(NCC Guidelines, para 18). Operator had to invest in deploying their networks across the country instead of leveraging on collocation and infrastructure sharing.

Due to construction activities, fibre optic broadband connections are frequently cut. In 2013, the NCC revealed that it had logged roughly 1200 fibre cable cuts (Osuagwu, 2014). The National Broadband Plan (2013) also revealed that one telecommunications provider spends USD 90 million annually to fix fibre cable breaks.

Similarly, security concerns constitute a challenge . Major security concerns include theft and deliberate destruction of telecommunications infrastructure.

The need for adequate and reliable power supply cannot be overemphasized as almost all telecommunications facilities require power to function. Power failures cause significant damage and downtime to equipment that control telecommunications networks.

Mitigating challenges of local content development in the telecommunications industry

To address the challenges , mitigating factors are identified below.

Adequate Funding

While the establishment of the National Information Technology Development Fund is laudable, the NITDA Act does not explicitly provide that the Fund shall be solely utilised for the development of information technology in Nigeria.

Infrastructure sharing and collocation

Some of the problems which infrastructure sharing and collocation could solve include cost implications of inadequate power supply, environmental (health) concerns and competitiveness in the Nigerian telecommunications sector's broadband division.

Harmonization of conflicting laws and regulations

The challenge of conflicting regulations could be addressed by harmonising regulations at the national level in collaboration with the Nigerian Communications Commission (NCC), the National Environmental Standards and Regulations Enforcement Agency (NESREA), and industry stakeholders.

Proper regional and urban planning

Addressing the challenge of regional planning would require effective urban development planning, compliance monitoring, and the enforcement of urban planning laws at all levels of government in collaboration with the regulatory authorities.

Subsidisation of broadband deployment operation

The topography of different regions in the country and large land mass are usually contributing factors affecting the technical architecture of fiber optic cable infrastructure. However, this could be addressed by subsidising broadband deployment operations through the Universal Service Provider Fund.

Conclusion

Predicated on the above, it is recommended that the legal and regulatory framework be improved to enhance local content development in the industry. By implementing effective regulatory measures, the industry can enhance local content and drive economic development despite the highlighted challenges.

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You must understand that there is more than one path to the top of the mountain.

Miyamoto Musashi

FROM THE WORLD OF RESEARCH

Policy guidelines and recommendations on AI use in teaching and learning: A meta-synthesis study

Aaron A. Funa, Renz Alvin E. Gabay

Abstract

As artificial intelligence becomes increasingly integral to educational systems, understanding policy guidelines and recommendations from various sources is crucial. This meta-synthesis examines AI policies and guidelines from peer-reviewed articles, reports, books, and websites from 2020 to 2024, with a focus on their implications for teaching and learning. Using a thematic analysis approach, the study categorizes findings into key themes and subthemes. Under the theme of policies and guidelines, notable subthemes include ethical AI use, AI literacy, and inclusivity and equity. In terms of implementation strategies, the synthesis identifies crucial areas such as student orientation and professional development, enhanced teaching tools and data-driven insights, improved student learning outcomes and engagement, and streamlined administrative processes. The study also determines practical constraints that challenge the successful integration of AI in education, including technical and integration challenges, training and support issues, ethical and fairness concerns, cost and accessibility, transparency and privacy issues, and misalignment with educational goals. Future research may explore the long-term impacts of AI integration policies and guidelines, refine practical implementation strategies, and foster collaboration among researchers, educators, and policymakers to tackle ongoing challenges and maximize AI's potential in education.

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FROM THE WORLD OF RESEARCH

Team decision-making behavior: An ecological dynamics approach

Duarte Araújo, Henrique Brito, Daniel Carrilho

Abstract

Athletes act intentionally and adaptively for achieving task goals in sport performance environments. The ecological dynamics approach to decision making understands the performer-environment system as the unit of analysis to understand behavior, where action is not just limited to processes occurring in the individual (e.g., information-processing theories) or in the environment (behaviorist approaches) but implies the close link between the two. In the present article we synthesize the key tenets of the ecological dynamics theoretical framework and describe how both individual and group decision-making in sport can be understood. We explain how behavior and decision-making are based upon self-organized processes, from which functional synergies emerge, paving the way for expert performance in individuals and groups. Specifically, considering group decision-making, we describe how team members are coordinated in the complex system that the team is. Finally, we suggest that the ecological dynamics approach is a well-suited framework to research individual and team cognition, with many applications to practice.

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