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## ALIGNING PEDAGOGY WITH THE SDGs: EXPLORING TEACHERS' USE OF LEARNING THEORIES TO PROMOTE QUALITY AND INCLUSIVE EDUCATION

<sup>1</sup>Anjum Naz, <sup>2</sup>Dr. Abida Nasreen, <sup>3</sup>Tariq Hussain

<sup>1</sup>MPhD, FAHE, FSET, ATS, MEd, PGCert, PGCE, Char teach, Qualified Assessor OCR, PPD(Cambridge), Consultant Commonwealth Commission, Head of Teaching & Learning (CSA), Department of Business and Management. Arden University, London, UK

<sup>2</sup>Associate Professor, Institute of Education and Research, University of the Punjab, Lahore

<sup>3</sup>Assistant Professor, Institute of Education and Research, University of the Punjab, Lahore, Pakistan. [anaz@arden.ac.uk](mailto:anaz@arden.ac.uk)

### Article Details

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Corresponding Author: \*

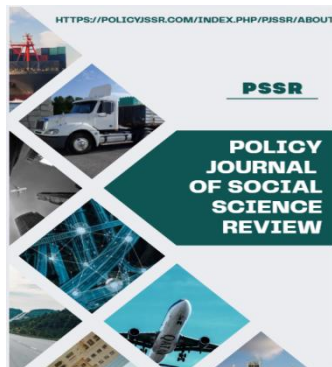
Anjum Naz

[anaz@arden.ac.uk](mailto:anaz@arden.ac.uk)

### ABSTRACT

*This study examines how teachers apply learning theories in their practice and the extent to which these practices align with United Nations Sustainable Development Goal 4 (SDG 4), which advocates for inclusive and equitable quality education for all learners. This research explores theoretical approaches that enhance inclusion, participation and learning in varied learning environments. The design used quantitative analysis of teachers' lesson plans and classroom assignments, and qualitative information from semi-structured interviews and classroom observations of 60 elementary and high school teachers. Correlational analyses and thematic coding were used to examine the link between learning theories and student engagement and achievement outcomes. Results show that constructivist and socio-cultural theories were most prevalent in practice, facilitating collaboration, critical thinking and student-centered learning. Teachers were flexible in adapting to diverse learning needs and formative assessment; yet their theoretical knowledge of inclusive pedagogy and professional learning resources through their workplaces were lacking. The quantitative findings confirmed that theory-based instruction had a positive impact on student engagement and achievement. The paper argues that SDG 4 can be achieved by enhancing teachers' pedagogical skills, embedding inclusive pedagogies into pre-service and in-service teacher education, and creating cultures of support for reflective, theory-informed teaching.*

**Keywords:** Constructivism, Inclusive education, Learning theories,



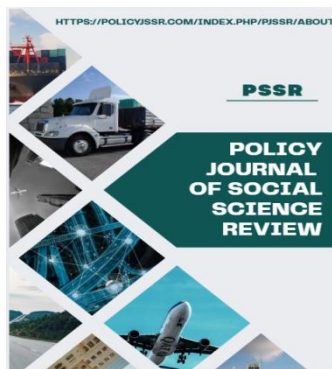
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*Pedagogy, SDG 4, Teacher practice*



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## 1. Introduction

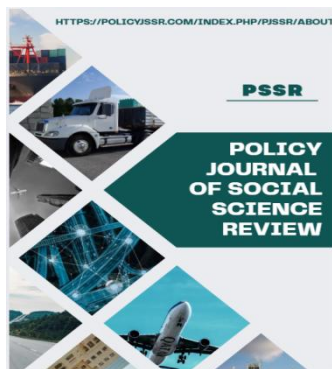
As global challenges continue to evolve, the role of education in promoting inclusive and sustainable societies has become more critical than ever. Sustainable Development Goal 4 (SDG 4) in the 2030 Agenda for Sustainable Development has set a new global education vision: inclusive and equitable quality education and lifelong learning opportunities for all (United Nations, 2015, p. 14). This includes ensuring equitable, relevant and inclusive teaching and learning activities, in addition to school enrolment. Pedagogy, defined as the science and practice of teaching, is a key tool to attain SDG 4. As such, educational reform strategies are largely dependent on teachers' interpretations and enactments of pedagogical frameworks to meet the needs of different learners. Over the past few years, there has been a recognition from the international education community about the need to design curriculum, assessment and teaching that is sustainable, inclusive and lifelong (UNESCO, 2020; Faisal et al., 2023).

Teachers and educators are increasingly challenged to navigate theoretical understandings and classroom practice through cultural, ability, and socioeconomic differences between learners. Theories of learning (constructivism, socio-cultural, behaviorism and humanism) provide standards for differentiating teaching to cater to individual learner needs. For instance, Vygotsky's socio-cultural theory

stresses social mediation of learning and scaffolding within the learner's zone of proximal development (Vygotsky, 1978). Likewise, constructivism, championed by Piaget (1972) and Bruner (1966), views learning as an active process of meaning construction, where knowledge is constructed by the learner. While these theories are rich in their conceptualisation, their implementation is patchy.

Teachers have the theoretical understanding of learning theories but lack the pedagogical skills to apply them in the classroom environment, especially in inclusive classrooms (Ainscow, 2020). This is particularly evident in settings with scarce resources, high class sizes and limited teacher training to implement inclusive, theory-based pedagogies. Inclusive education has evolved from being a marginal issue to a mainstream policy priority around the world. The Education 2030 Framework for Action states that educational transformation requires pedagogical transformation that enables all learners, regardless of disability, gender, language or socioeconomic background (UNESCO, 2017). Teachers are pivotal to this shift. Their use of learning theories to respond to students' needs is a critical factor in the inclusiveness and quality of learning. This research highlights pedagogy as a key link between theory and the achievement of SDG 4 by exploring the application of learning theories by teachers to enable inclusion and quality learning.

## 2. Significance of the Study



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This study is significant on three fronts: policy, professional and pedagogical. At the policy level, this research supports national and international efforts to translate SDG 4 onto the ground by analysing pedagogic practices that promote quality and inclusive learning. The study can help guide teacher education and professional development programs through examining teachers' enactments of learning theories in the classroom. Professionally, the study adds to the body of knowledge on how teachers translate theoretical principles into practice in specific teaching contexts, highlighting capacity-building needs, and clarifying the importance of theory-informed practice to achieve equity.

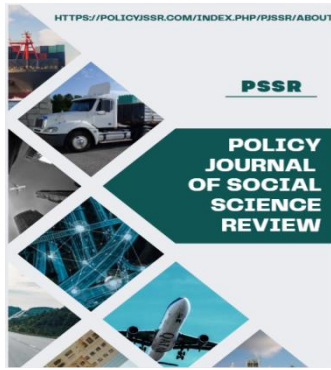
The study provides a pedagogic example of how teachers can operationalise learning theories in the classroom to meet the needs of a wide range of learners, engage active learning and avoid exclusionary practices. In addition, this research contributes to the discourse on Education for Sustainable Development (ESD) by linking pedagogical reform to sustainability principles such as equity, participation and empowerment (Tilbury, 2011). Sustainable pedagogy not only involves learning about sustainability, but also designing pedagogies that promote critical thinking, social activism and inclusion (Faisal et al., 2024). To align SDG 4 with pedagogy, it is not enough to adjust the curriculum but to also reshape teacher philosophies, practices and classroom dynamics along constructivist and socio-cultural lines.

### 3. Problem Statement

While the world has focused on inclusive and equitable education, a disconnect remains between what is learned and what is applied in practice. While learning theories are widely taught in teacher education, they are often difficult for teachers to apply to complex learners, such as those with disabilities, language, or socioeconomic backgrounds (Florian & Beaton, 2018). The literature suggests unsystematic use of knowledge bases, insufficient reflection on practice and lack of institutional support to implement theory-informed inclusive practice limit teachers' ability to practice inclusive pedagogy (UNESCO, 2020). Many education systems continue to use didactic and assessment-oriented pedagogies that emphasise content coverage, rather than interaction and co-operation (Alexander, 2017). Such conventional pedagogies do not address the diverse learning needs of contemporary classrooms. As a result, inclusive education is genuinely at risk of becoming so. In order to achieve SDG 4, researchers need to explore how teachers are currently using - and could use - learning theories to promote inclusive learning. This paper helps to achieve this goal by exploring the pedagogical alignment of the use of learning theories with inclusive quality education goals.

#### 3.1 Research Objectives

To examine teachers' use of learning theories (constructivism, socio-cultural theory, behaviorism, and humanism) to create an inclusive and equitable learning



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environment To explore the connection between teachers' learning theories and their classroom practices to achieve quality education To explore barriers and facilitators in applying learning theories in the classroom in line with SDG 4.

### **3.2. Research Questions**

1. How do teachers employ learning theories to enhance inclusivity and quality within classroom pedagogy?
2. What relationship exists between teachers' knowledge of learning theories and their practical pedagogical implementation?
3. What institutional, contextual, or professional factors facilitate or hinder the effective use of learning theories to achieve SDG 4 objectives?

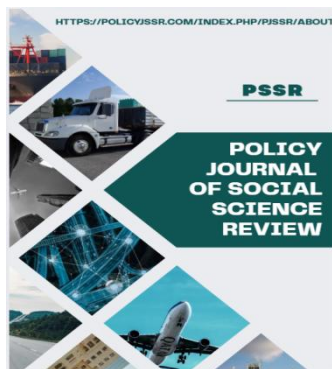
### **4. Literature Review**

#### **4.1. Learning Theories to Support Inclusive Pedagogy**

Theories of learning offer theoretical frameworks for knowledge construction, processing and use. Bruner (1966) and Piaget (1972) built constructivism on the idea that learning is an active process that takes place in experiential settings, where learners apply positive interactions with their environment to build knowledge. In inclusive education, constructivism enables differentiated instruction and independence by recognising individual learner differences. Vygotsky's (1978) socio-cultural theory builds on this, with a focus on social learning. Collaboration, scaffolding and peer-to-peer learning create inclusive learning environments that promote peer learning. Often linked to conventional teaching, behaviorism

provides reinforcement techniques that encourage student engagement and participation regardless of variability in individual behaviours and skills (Skinner, 1953). Recent research underscores that inclusive teaching "borrows" from various learning theories (Florian & Black-Hawkins, 2011). This allows teachers to cater to diversity through a mix of constructivist, socio-cultural and behavioural engagement. Therefore, decisions in alignment with SDG 4 goals draw upon teachers' learning theory expertise. Pedagogical Alignment with SDG 4 SDG 4 prioritises quality and inclusivity.

As UNESCO (2020) recognises, quality education cannot be realised without inclusive efforts, and inclusivity is meaningless without quality education (Makhdam & Khanam, 2021). When pedagogy is aligned to SDG 4, teachers create responsive, participatory and equitable learning experiences to meet learner diversity. Research shows that learner-centred approaches (such as inquiry and problem solving) increase equity through a consideration of multiple perspectives (Schweisfurth, 2015; Ainscow, 2020). These approaches align with constructivist approaches that see learners "building knowledge" in social and cultural settings. And pedagogy aligned to SDG 4 includes integrating Education for Sustainable Development (ESD) into school curricula (Faisal et al., 2024). Sterling (2016) suggests that ESD necessitates transformative learning which promotes critical reflection,



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systems thinking and empowerment. Therefore, teachers' ability to apply learning theories is essential in integrating sustainability in curriculum and pedagogy.

#### ***4.2. Teachers' Application of Learning Theories***

The application of learning theories is an enduring issue. Research in both developed and developing countries shows that while teachers acknowledge the importance of learning theories, their use is inconsistent as they are limited by time, curriculum demands and lack pedagogical training (Forlin & Chambers, 2017). Studies by Florian and Beaton (2018) and Sharma (2018) suggest inclusive teaching practices are more effective when teachers reflect on their practice and receive feedback from their peers. These help them translate theoretical understanding into practical strategies in context. But teacher professional development focuses on theoretical training rather than modelling and experimentation in classrooms (Pantić & Florian, 2015). This has led to teachers' difficulties applying socio-cultural or constructivist theories to their diverse classrooms, favouring traditional teacher-centered teaching methods. The disconnect between theory and practice highlights the need for systemic support such as mentoring, feedback and institutional encouragement.

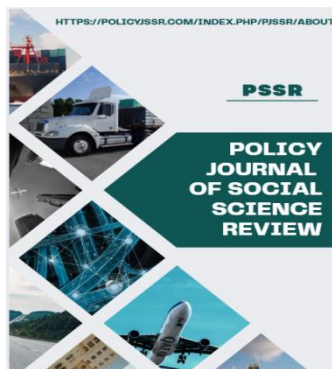
#### ***4.3. Inclusive Education and Teacher Agency***

Inclusive education is not just a policy matter but relates to teacher agency, or teachers' ability to exercise professional judgement in pedagogical decisions that acknowledge diversity (Florian & Spratt, 2013). Agency allows teachers to translate theories about learning into pedagogic practice, striking a balance between prescription and autonomy. International evidence suggests that when teachers see inclusion as an aspect of good teaching rather than something 'added on', they are more consistent with SDG 4 (Ainscow, 2020). By contrast, when inclusion is seen as an external imposition, teachers' responses are compliance-based. Therefore, teacher agency is an intermediary variable between theory and practice.

#### ***4.4. Inhibitors of Theory-Based Inclusive Teaching***

There are several structural and cognitive barriers to the use of learning theories in inclusive pedagogy (Makhdom & Mian, 2012). Commonly mentioned barriers include a lack of teacher training and support, inflexible curricula and class sizes (Forlin, 2018). Furthermore, cultural views of disability and diversity influence classroom practice. Collaborative and reflective practices are often not present in many contexts (Schuelka, 2018). These issues highlight that pedagogical change towards SDG 4 cannot occur in a vacuum but must be supported by changes in school management and pre-service education.

#### ***4.5. Research Gaps***



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Although there are rich bodies of literature on learning theories and inclusive education, few research studies examine the relationship between the application of learning theories and SDG 4 (Makhdum et al., 2023). Research tends to focus on these separately - learning theory as psychological construct and SDG 4 as policy aspiration. Their intersection offers holistic view of translating global goals into classroom practice. UNESCO (2020) states a key to SDG 4 is to transform teaching and learning using robust learning theory (Makhdum et al., 2023). This study fills this gap by empirically linking theoretical constructs to pedagogical practice leading to inclusion and quality.

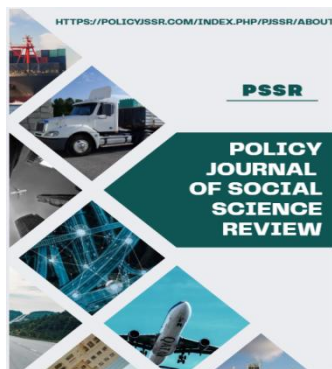
## 5. Research Methodology

### 5.1. Research Design

Research Design A mixed-methods design was used to explore teachers' use of learning theories to implement practices in line with SDG 4. This approach was chosen to investigate quantitative associations between the application of learning theories and indicators of quality teaching and inclusivity, as well as understanding the lived experiences, attitudes, and barriers in translating theory into practice in the classroom. The mixed methods approach allowed quantitative evidence to be integrated with qualitative depth, to provide comprehensive detail of both the patterns and meanings of teaching practice (Creswell & Plano Clark, 2018). A convergent parallel design was adopted, where quantitative and qualitative data

was collected and analysed at the same time to complement each other. This included quantitative data to numerically represent the implementation of learning theories by teachers, and qualitative data to represent perspectives that could not be quantified. This approach improved interpretive validity and triangulation. Data triangulation provided consistency verification, results triangulation and deepened our understanding of how learning theories inform effective teaching practices in classrooms (Johnson & Onwuegbuzie, 2004). Setting and Participants It was carried out in 20 public and private schools that adopted inclusive education policies consistent with national policies on SDG 4.

This context was chosen for its diverse learning spaces in urban and semi-urban settings, and the inclusion of schools with different levels of resources, diverse student and teacher profiles. A sample of 60 teachers (30 primary and 30 secondary teachers) from various subjects such as English, maths, science and social studies were selected. This allowed for comparisons across subject areas, while maintaining depth of understanding about teaching practices. Purposive sampling was used to ensure participants were actively teaching with some previous professional development in inclusive education or teaching practices. This ensured participants were able to exemplify their use of learning theories. Participants had to have at least three years' teaching experience to have established teaching practices.



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Administrators from each school helped to select teachers known to engage in reflective teaching practice. A sample size of 60 was considered sufficient for mixed-methods studies, considering the analytical needs of the study, representativeness and diversity (Patton, 2015).

## 5.2. Research Instruments

Data collection involved a questionnaire, observation tool and interview questions.

5.2.1. Questionnaire: The questionnaire collected quantitative information about the extent and ways teachers applied certain learning theories when planning and implementing lessons. This included closed and Likert-scale questions on theoretical understanding (e.g. "I plan lessons based on constructivist principles"), inclusive pedagogy (e.g. "I differentiate content based on student abilities"), and institutional support (e.g. "My school acts as a barrier to implementing new teaching strategies"). Questions were modified from previously developed instruments in inclusive education and pedagogical knowledge (Forlin, 2018; Sharma, 2018) and framed in the context of SDG 4.

5.2.2. Observation Checklist: The checklist allowed systematic documentation of various classroom practices and pedagogic approaches showing operationalisation of theories of learning. Aspects included students' engagement, group activities, feedback practices, individualisation and inclusion of classroom dialogue. Teachers were observed twice (non-participant) over two

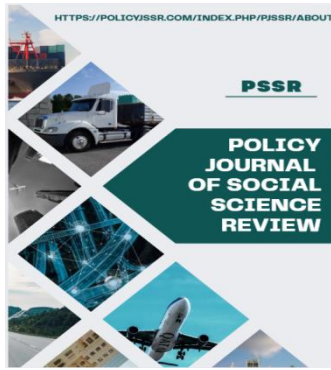
months for regular lessons. The checklist was complemented with notes on contextual factors (class size, diversity, resources).

5.2.3. Interview Protocol: The semi-structured interview guide provided qualitative data about teachers' beliefs, motivations and challenges. Questions included: "How do you apply learning theories in your lesson planning for diverse learners?" "What are the barriers to inclusive teaching?", and "What could help you better integrate teaching theory informed practice in the classroom?". Interviews, with participants' permission, were recorded and ranged from 45-60 minutes. The unstructured questioning enabled participants to share their experiences and for the researcher to probe for further information.

## 5.3. Data Collection Procedures

Twelve weeks were devoted to data collection. During the first phase, surveys were distributed to all 60 participants and collected immediately, resulting in a 100% response rate (surveys were given during school hours). The second phase included classroom observations, to which 40 teachers agreed. Lessons were observed for 40-50 minutes, with extensive field notes written immediately following observations. The third phase involved interviews with 25 teachers, selected as high and low users of learning theory-based practices according to questionnaire data. This sample allowed contrasting and comparison of teaching styles and context.

## 6. Data Analysis



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## **6.1. Quantitative Data Analysis**

Data was coded and analysed using SPSS. Descriptive statistics (means, standard deviations, and frequencies) were used to illustrate trends in teachers' application of learning theories. Comparative statistics (Pearson correlation and ANOVA) were used to explore relationships between their knowledge of learning theories and their inclusive teaching, and years of teaching experience.

## **6.2. Qualitative Analysis**

Thematic analysis of interview and observation data was conducted in six steps, as outlined by Braun and Clarke (2019): familiarisation; coding; generating initial themes; reviewing themes; defining and naming themes; and synthesis. This involved generating and reviewing themes and patterns such as "theory-practice integration," "institutional constraints" and "teacher agency". Qualitative data segments were coded and retrieved using NVivo. Integration: Quantitative and qualitative data were triangulated in the interpretation stage, where quantitative patterns were matched with qualitative themes to get a holistic view of teachers' understanding of learning theories.

## **6.3. Reliability and Validity**

The instruments were tested on 10 teachers outside the sample to check their clarity, relevance and consistency. Cronbach's alpha for main scales ranged between 0.78 and 0.86, showing high

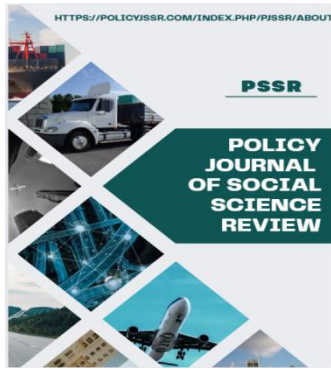
reliability (Field, 2018). Observation and interview guidelines were modified following pilot testing. Content validity was confirmed by three experts in educational psychology and inclusive education reviewing the surveys' content for conceptual clarity and alignment with learning theory constructs. Construct validity was achieved through exploratory factor analysis to ensure alignment of items with theoretical knowledge, inclusive pedagogy and institutional support. Data triangulation (survey, observation, interviews) alleviated mono-method bias (Lincoln & Guba, 1985). Data were checked for accuracy by summarising interview results and discussing these with participants.

## **6.4. Ethical Considerations**

Rigorous ethical procedures were followed for data collection and analysis. Participants were provided with an informed consent form and responses were anonymised. Consent was freely given, with participants given the option to withdraw at any time. The study adhered to UNESCO (2020) ethical principles for research with teachers and students, such as respect, openness and non-coercion.

## **6.5. Reflexivity**

A reflexive journal recorded personal reflections, methodological choices, and interpretations throughout the study to enhance transparency and accountability, key tenets of qualitative validity (Creswell & Poth, 2018).



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## 7. Research Findings

### 7.1. Descriptive Analysis

Table 1

*Teachers' Knowledge and Use of Learning Theories (N = 60)*

Level	Constructivism	Socio-Cultural	Behaviorism	Humanism	Overall Avg %
High (4-5)	45.7%	41.7%	29.3%	35.0%	38.0%
Moderate (3)	37.7%	40.0%	47.3%	42.3%	42.1%
Low (1-2)	16.6%	18.3%	23.3%	22.7%	20.0%

Constructivism emerged as the most widely recognized and implemented framework, consistent with global pedagogical shifts toward learner-centered teaching (Schweisfurth, 2015; Makhdum et al., 2023). Teachers reported using experiential learning, group work, and problem-oriented tasks. Socio-cultural theory ranked second, with teachers acknowledging the importance of collaborative learning. Behaviorism, while less prevalent, remained useful for

behavior reinforcement and classroom discipline. Humanism slightly exceeded behaviorism, indicating growing awareness of emotional and motivational factors in learning.

Approximately 80% of teachers applied at least one learning theory principle to classroom practice, but only 38% did so consistently at a high level. This aligns with Sharma's (2018) finding that practice may be inhibited by workload and resource constraints.

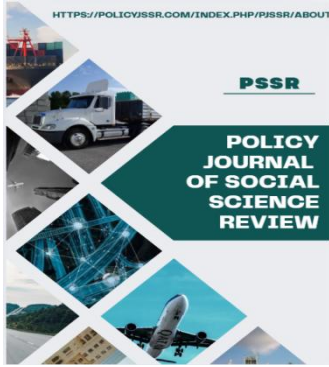
Table 2

*Frequency of Inclusive Pedagogical Practices (N = 60)*

Inclusive Practice	Frequency	Percentage
Differentiated instruction	44	73.3%
Peer collaboration / group learning	41	68.3%
Formative assessment and feedback	38	63.3%
Use of learning aids and manipulatives	34	58.3%
Integration of digital tools	29	48.3%
Individual learning plans / accommodations	22	36.6%

Differentiated instruction and peer collaboration were the most commonly implemented strategies, aligning with constructivist and socio-cultural principles (Vygotsky, 1978). Formative assessment emerged as a strong support for diverse learning needs, corroborating

Florian and Black-Hawkins (2011). However, individual learning plans remained less common, suggesting teachers predominantly use whole-class strategies rather than individualized approaches.



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Constructivist and socio-cultural methods dominated current pedagogy, reflecting international trends promoting learner-centered environments (UNESCO, 2020). However, lower representation of behaviorism and humanism indicates underutilization of reinforcement and affective learning strategies, which are pivotal for inclusiveness, particularly for students

requiring additional behavioral or emotional support.

Overall, descriptive analysis demonstrates that although teachers are aware of various learning theories, their application to inclusive and sustainable pedagogy remains uneven. Institutional focus on examination results and curriculum coverage frequently constrains opportunities for creative, theory-based instruction (Ainscow, 2020).

## 7.2. Inferential Analysis

**Table 3**

*Pearson Correlation Matrix for Core Variables (N = 60)*

Variables	1	2	3
1. Theoretical knowledge	1	.68**	.42*
2. Inclusive pedagogical practices	.68**	1	.33*
3. Years of teaching experience	.42*	.33*	1

\*Note: \*p < .05; \*\*p < .01\*

Findings reveal a strong positive correlation ( $r = .68$ ,  $p < .01$ ) between teachers' theoretical knowledge and inclusive pedagogical practices. Teachers with clearer understanding of learning theories were more likely to employ inclusive approaches, supporting Pantić and Florian (2015). Theoretical knowledge and years of teaching

experience were moderately correlated ( $r = .42$ ,  $p < .05$ ), suggesting experience contributes to pedagogical wisdom but does not guarantee theory-based practice. The relatively low correlation between experience and inclusive practices ( $r = .33$ ,  $p < .05$ ) suggests that ongoing professional development is crucial for promoting inclusive teaching.

**Table 4**

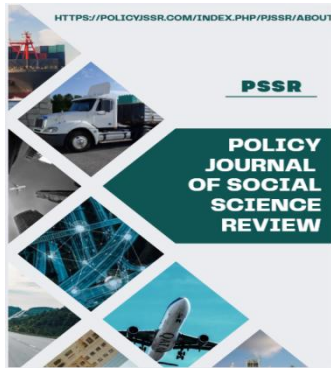
*ANOVA Results: Differences by Teaching Level*

Source	SS	df	MS	F	p-value
Between groups	1.83	1	1.83	4.56	0.037*
Within groups	22.39	58	0.39		
Total	24.21	59			

\*Note: \*p < .05\*

A statistically significant difference emerged in learning theory application between primary and secondary teachers

( $p = 0.037$ ), with primary teachers recording higher mean scores. This trend may be explained by primary education's



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focus on foundational learning and holistic development, which aligns with constructivist concepts. Secondary teachers work within examination-driven systems that limit flexibility (Alexander, 2017), reflecting Schweisfurth's (2015) observation that learner-centered practices decrease at higher educational levels.

A one-sample t-test comparing teachers who had participated in inclusive education professional development workshops ( $n = 30$ ) with those who had not ( $n = 30$ ) indicated a significant difference in inclusive practice scores ( $t = 2.71$ ,  $p = .009$ ). Participants demonstrated greater integration of learning theory-based strategies, confirming the effectiveness of continuous professional learning (Forlin, 2018) and supporting UNESCO's (2020) position that capacity-building programs are key to SDG 4 achievement.

### 7.3. Qualitative Integration

Interview results showed that teachers who articulated concrete theoretical justifications for their teaching choices expressed greater confidence in adapting

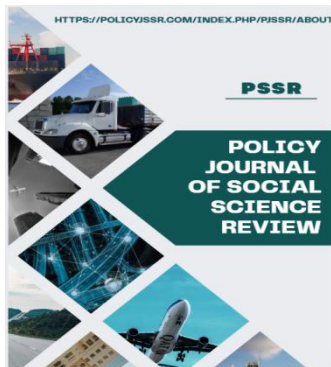
lessons to diverse learners. For example, teachers referencing Vygotsky's scaffolding concept described opportunities provided by peer tutoring and collaborative projects. Those citing Bruner's discovery learning noted that inquiry-based activities enhanced engagement among students of varying abilities. Teachers less conversant with theoretical ideas tended to adopt rote or teacher-centered instructional approaches, viewing inclusion as an administrative mandate rather than a pedagogical principle.

Field observations confirmed these differences. Classrooms where constructivist strategies were actively applied featured engaged learners who asked questions and solved problems collaboratively. In contrast, classrooms characterized by direct instruction showed low engagement levels, particularly among learners with difficulties. These discrepancies reflect Florian and Spratt's (2013) continuum of pedagogical inclusion, from tokenistic to transformative, theory-based inclusion.

### Table 5

#### *Integration of Indicators by Theoretical Understanding Level*

Theoretical Understanding	Mean Inclusive Practice Score (1-5)	Qualitative Indicators Observed
High ( $n = 20$ )	4.31	Regular scaffolding, collaborative tasks, reflective dialogue
Moderate ( $n = 25$ )	3.67	Infrequent adaptation of teaching strategies and limited feedback cycles
Low ( $n = 15$ )	2.95	Lecture-dominated teaching with restricted adaptability and low



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learner participation

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Inclusive practice scores improved linearly with theoretical knowledge, validating the quantitative relationship. Qualitative patterns showed high-theory teachers addressing learner diversity through social interaction and formative assessment, while low-theory teachers demonstrated procedural rather than conceptual inclusion. This tripartite evidence supports theoretical literacy as a precursor of inclusive teaching (Florian & Beaton, 2018).

#### **7.4. Summary of Key Findings**

1. **Theoretical understanding** strongly predicts inclusive pedagogical behavior.
2. **Professional development** significantly enhances teachers' capacity for theory-informed practice.
3. **Primary-level teaching contexts** are more conducive to theory-based inclusion than examination-focused secondary settings.

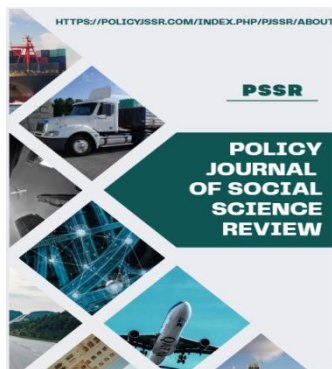
These findings substantiate the argument that teacher preparation grounded in learning theory is a crucial mechanism for achieving SDG 4 targets on quality and inclusion. Results also expose structural limitations, including inadequate institutional support, that hinder consistent theory application across contexts

#### **8. Discussion**

The findings showed SDG 4-aligned pedagogy is heavily influenced by

teachers' use of learning theories. The quantitative and qualitative data show that although teachers have moderate to high levels of awareness of constructivism, socio-cultural theory and humanism, their classroom practice varies. Constructivist and socio-cultural theories were evident in collaborative practice, student-centered teaching and experiential learning. But there were clear deficiencies in the translation of theory into consistent inclusive practice, limited by institutional factors (instruction, assessment, professional development). The quantitative findings indicate that 80% of teachers applied at least one of the theoretical principles in their teaching, with constructivism and socio-cultural theory being the most frequently used.

The high correlation between knowledge of learning theory and inclusive classroom practice ( $r = .68, p < .01$ ) indicates that greater understanding of learning theory is evident in more inclusive classrooms. Teachers with verbally expressed, theoretical justifications for their teaching practices more frequently adopted differentiated instruction, scaffolding and formative assessment. This evidence confirms the link between classroom inclusivity and pedagogical knowledge found by Florian and Black-Hawkins (2011) and Sharma (2018). There were differences in the



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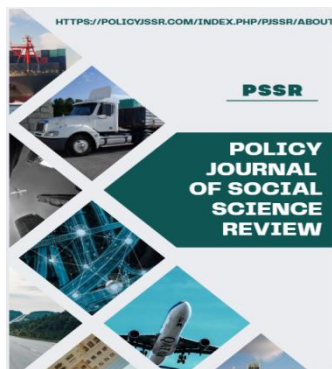
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application of learning theory across grade levels. Primary teachers used more constructivist and socio-cultural approaches than secondary teachers ( $p = .037$ ). This is because primary education's structural and pedagogic orientation towards developmental learning and flexibility is in contrast to the examination- and subject-based focus of secondary education that allows less scope for interactive learning (Alexander, 2017). Primary teachers commonly reported the use of peer scaffolding, manipulatives, and group work to engage learners while secondary teachers reported time and curriculum inflexibility as barriers to learner-centered strategies. This finding reinforces Schweisfurth's (2015) argument that learner-centered approaches face institutional resistance in higher education due to institutional priorities and high-stakes testing.

Professional development was crucial in the promotion of theory-based inclusive pedagogy. Teachers who attended inclusive education workshops had significantly higher scores on indicators of their theoretical knowledge and inclusive practices ( $t = 2.71, p = .009$ ). Interview evidence showed these teachers were more confident in enacting constructivist or socio-cultural pedagogies, such as project-based learning, formative assessment and problem-based learning. They also displayed greater reflexivity and responsiveness, consistent with Forlin's (2018) claim that continuing professional education supports responsiveness and

theory-practice connections. This connection highlights the need for lifelong professional learning to develop skills needed to meet SDG 4. The qualitative data provided insight into the interplay of theory, context and teacher agency. Teachers generally described constructivist and socio-cultural approaches as effective for inclusion, especially of students with learning challenges. A number of teachers described how they used peer mentoring or group questioning to ensure the participation of students with learning difficulties - a notion Vygotsky (1978) recognised as social mediation of learning. But most teachers found it difficult to sustain these strategies because of large class sizes, lack of support staff and inflexible timetables. This echoes Ainscow's (2020) view that inclusion is about systemic not classroom reforms.

Educators observed that school cultures devalue innovative teaching approaches, which favour exam scores and standardised outcomes, and prevent the use of theory-based approaches focusing on learner needs. Our study also found shortcomings in the inclusion of humanistic and behaviorist principles, crucial to addressing the emotional, motivational and behavioural dimensions of inclusion. Teachers recognised the value of empathy, support and positive reinforcement but were not trained in the development of humanistic or behaviorist interventions. As a result, inclusion was focused primarily on



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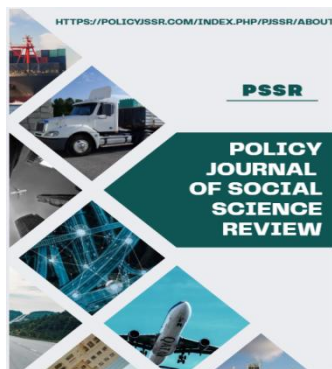
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academic differentiation, rather than the whole child. This partial use is what Florian and Beaton (2018) describe as "fragmented inclusivity" where teachers apply adjustments along cognitively based lines without considering the social and affective dimensions.

The findings indicate a need for greater theoretical support including the entire range of learning theories that inform inclusion and well-being. Interviews also revealed considerable institutional support for inclusive teaching. Schools with professional learning communities and collaborative planning structures supported teachers with more confidence and the regular use of theory-based teaching. By contrast, in resource poor schools, teachers felt alone and lacked mentors. These results support Pantić and Florian's (2015) finding that teacher agency is supported when schools build collaborative cultures focused on reflection and collective professional growth. Moreover, teachers who felt their school leadership was supportive of inclusion were more likely to reflect on their practice and experiment with new approaches. This finding supports UNESCO's (2020) suggestion that the implementation of inclusive education policies needs whole system support and leadership.

The inferential analysis revealed that although theoretical knowledge is related to inclusive pedagogies, contextual and experiential factors are also significant. While theoretical knowledge formed a foundation, teaching experience

correlated with inclusive practice only moderately ( $r = .33$ ,  $p < .05$ ), meaning that experience alone is not sufficient for effective use of learning theories. Teachers with years of experience but without current professional learning practices reverted to teacher-centered approaches, showing the need for ongoing learning for pedagogic innovation. Inclusion is a dynamic rather than static process, as Florian and Spratt (2013) note. Therefore, to align SDG 4 with education, we need ongoing institutional support for teacher learning, such as mentoring, peer observations, and reflection. Thematic analysis of interviews identified three key themes: conceptual alignment, practical translation and institutional constraint. Conceptual alignment is teachers' understanding of the links between learning theories and inclusion - most commonly demonstrated through scaffolding, differentiation and promoting learner autonomy. But translating these concepts into practice was less uniform, with teachers often failing to translate these ideas into meaningful lesson plans or assessment. Structural constraint became an issue; time, training and administrative pressures. For example, teachers felt they had to choose between inclusive and participatory pedagogies and complying with external curriculum and assessment guidelines. These observations resonate with Tilbury's (2011) analysis that delivering SDG 4 requires educational systems to re-orient pedagogy from



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transactional to transformative. Our findings also make significant contribution to the understanding of teacher agency in the policy framework of SDG 4. Teachers who understood inclusion to be part of good teaching practice were more resourceful and resilient in drawing on learning theories in the face of constraints. They modified curricula, used formative assessments and peer mentoring to enhance inclusive participation.

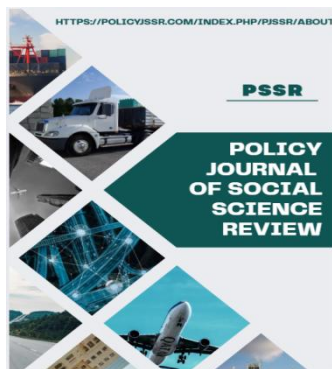
By contrast, teachers who considered inclusion a management issue reverted to traditional teacher-centred approaches. This difference confirms Florian and Spratt's (2013) distinction between individualisation and inclusive pedagogy - the latter as an approach whereby inclusion is not mandated but inherent in pedagogy. The study supports the argument that long-term inclusive practice relies on teachers' abilities as reflective practitioners who internalise learning theories as tools for promoting equitable learning.

Triangulation of quantitative and qualitative data confirms that quality and inclusive pedagogy depend on teachers' theoretical literacy. Classrooms where teachers embody learning theories are collaborative and interactive learning spaces. This leads to greater engagement, respect and belonging, which are attributes of SDG 4. But research findings suggest theory needs to be complemented with contextual and institutional support. Without institutional and professional support

and policy alignment, learning theories do not drive inclusion.

In the context of sustainable development, this research adds to global conversations by showing how pedagogical theory can be used to implement SDG 4 in the classroom. Results suggest that inclusive, quality education cannot be realised by simply declaring it but must be realised by pedagogical change based on established learning theories. Theories of constructivism and socio-cultural approach were particularly useful, with their emphasis on co-operation, dialogue and co-construction of knowledge, which naturally lead to equity and inclusion (Vygotsky, 1978; Bruner, 1966). These findings reiterate UNESCO's (2017) argument that a change in teaching and learning is required for the establishment of inclusive education.

The findings also echo Sterling's (2016) view that education for sustainable development calls for transformative pedagogies that rely on critical reflection, empowerment and participation. Policy implications include the need for teacher education programs to more explicitly address connections between learning theory and inclusive pedagogy. Teacher education needs to provide more than theoretical exposure to inclusivity but also practical experience of modelled inclusivity. Reflective case study analysis, micro-teaching and classroom inquiry would enhance theory-to-practice linkages.



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Professional learning activities for practising teachers should emphasise responsive strategies for individual learners and opportunities to solve problems collectively. School leaders also have a pivotal role in building professional learning communities to sustain pedagogic innovation.

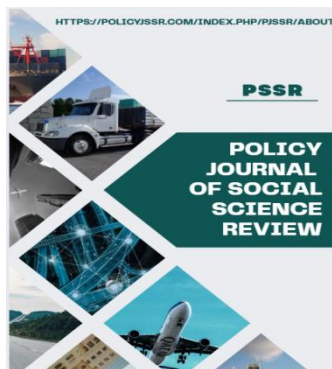
## 9. Conclusion

This research study concludes that a pedagogy aligned to SDG 4 is a combination of theories, practices and institutional factors. The research supports the claim that teachers with greater theoretical knowledge are more likely to adopt inclusive, participatory pedagogies to ensure quality education for all. Socio-cultural and constructivist approaches were most successful for this aim, as they support interaction and engagement with peers, which underpins inclusivity. But constraints such as lack of training, lack of resources and rigid forms of assessment still limit the effective practice of inclusive pedagogy.

The final message is that teachers make inclusive and equitable education. Their ability to comprehend and apply learning theories translates global visions of quality and inclusiveness into classroom practice. Through closing the gap between theory and practice, teachers can turn classrooms into spaces that make all learners feel valued, empowered and supported. The findings of this study confirm learning theory-based pedagogy is not only an academic but also a moral and social duty to achieve sustainable education.

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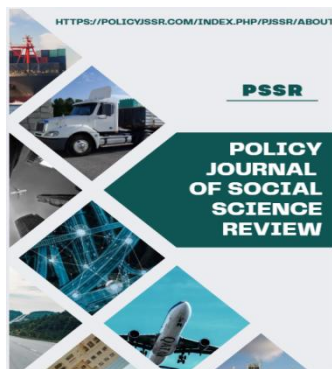


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