

Alignment or Mismatch? Teacher Subject Combinations and School Labour Market Demand in Limpopo Province, South Africa

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Abstract. This study investigated the alignment between the subject specialisation combinations offered by the teacher training programmes at a selected university with the demand for specialisation combinations at schools in the South African province of Limpopo. While a shortage of teachers is often framed as a quantitative deficit, this study used labor market theory and human capital theory to argue that the crisis is fundamentally a qualitative mismatch between how specialisations are bundled by teacher training programmes and the combinations required by schools. Employing a qualitative descriptive document analysis and comparative research design, we purposively sampled 56 teacher vacancy advertisements as a proxy for revealed demand and compared them against the subject specialisation pairings produced by the University of Limpopo. The findings reveal a significant disciplinary contextual gap: the university offered standardised, policy-aligned clusters of subject specialisations, whereas schools—particularly in resource-constrained rural areas—demanded teachers with multiple specialisations from different disciplines to manage limited staffing and timetable constraints. High alignment between supply and demand was evident for some conventional subject specialisation combinations, such as Mathematics and Physical Sciences, and Foundation Phase subject bundles. Partial alignment and structural mismatch were identified where schools required hybrid or cross-disciplinary combinations, such as Mathematics and EMS, Accounting and Sepedi, or phase-spanning primary school teaching. The study concludes that teacher labour-market mismatch in Limpopo is due not only to a shortage of teachers but results from a configuration problem, where qualified teachers may be less employable if their subject specialisations do not match schools' operational needs. The study recommends stronger use of vacancy data in teacher education planning, more flexible subject-combination pathways, and improved

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coordination between universities, the Department of Basic Education, and the Department of Higher Education and Training.

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1. Introduction

The alignment between teacher education and school-level staffing needs is a critical concern for education systems globally, particularly in contexts characterised by resource constraints and uneven distribution of skills. In South Africa, this issue is especially pronounced, as schools continue to report difficulty recruiting appropriately qualified teachers despite teacher training programmes regularly producing new graduates (Aloovi, 2025; Mtika & Sosu, 2025; Ndebele et al., 2024). This paradox raises important questions about the efficiency of the teacher labour market and the extent to which teacher training programmes are responsive to the actual demands of schools.

Teacher education and school staffing in South Africa are shaped by several interrelated national policy and planning frameworks. The Minimum Requirements for Teacher Education Qualifications (MRTEQ) provides the national framework for the design, accreditation and implementation of teacher education programmes, specifying qualification pathways as well as phase and subject specialisation requirements for prospective teachers (Department of Higher Education and Training [DHET], 2015). The policy is intended to ensure a coherent approach to teacher preparation by aligning teacher qualifications with the professional and curriculum requirements of the schooling sector (DHET, 2015).

The Curriculum and Assessment Policy Statement (CAPS) serves as the national curriculum framework, outlining subjects, content, assessment standards and learning expectations for each schooling phase. Consequently, CAPS plays a significant role in determining the types of subject specialisations and teaching competencies required by schools (Department of Basic Education [DBE], 2011; ; Chinyama & Mpisi, 2025). In addition, national teacher workforce planning initiatives influence the prioritisation of specific teaching specialisations for recruitment, funding and employment. For instance, the Department of Basic Education monitors and analyses teacher supply and demand to better align teacher education output with projected staffing needs, while the Funza Lushaka Bursary Programme prioritises subject areas for which there is a shortage of teachers (DBE, 2025a; DBE, 2025b; Simkins, 2015).

Although these frameworks and initiatives play an essential role in aligning teacher education, curriculum delivery, and workforce planning, difficulties may arise when standardised teacher education pathways do not fully align with the hybrid subject combinations and staffing needs of schools in specific provincial or local contexts. Recent research has demonstrated that aggregated statistics on teacher supply can mask significant variations across phases, subjects and locations. This highlights the importance of approaches to teacher workforce

planning that are sensitive to context and recognise specific specialisations (Gustafsson, 2025; van der Berg et al., 2025; Tewari & Ilesanmi, 2020; Sithole & Khohliso, 2025; Chinyama & Mpisi, 2025).

Labour market theory puts forward the concept of ‘mismatch’ – where the skills supplied by training institutions do not match employer demand, resulting in inefficiencies (Mejia et al., 2025). In the context of teacher education, mismatch occurs not only for individual subjects but also when the combinations of subjects in which teachers are trained do not match the combinations required by schools. While schools often require teachers to teach particular combinations of subjects due to timetabling needs, resource constraints, and contextual realities, novice teachers may not have been trained in these subject combinations. As a result, a novice teacher may be unable to find employment or may be underutilised in their post if their subject combination does not align with the school’s requirements (Mukhtar & Sumarti, 2025; Demapendan, 2024; Welter et al., 2022).

Previous research in South Africa has focused largely on aggregate subject shortages, particularly for STEM for which teachers are in high demand (van der Berg et al., 2022; Muremela et al., 2023;). While the findings provide valuable macro-level insights, they often overlook the micro-level dynamics of the labour market, including how subject specialisation combinations are configured at the level of the training programme and what combinations are demanded at the level of the school (van der Berg et al., 2022). Furthermore, Mankki (2023) claims that there has been limited empirical research using real-time labour market data, such as job advertisements, to examine how schools articulate their staffing needs in practice.

In Limpopo, one of South Africa’s predominantly rural provinces, many schools operate in resource-constrained environments that face persistent challenges relating to infrastructure, teacher availability and the equitable provision of educational resources (, Omojemite, 2025; Motadi, 2025). Research has demonstrated that rural schools in Limpopo frequently contend with shortages of qualified teachers, limited teaching resources and contextual challenges that affect curriculum delivery and staffing arrangements (Sibuyi et al., 2024; Mashiane-Nkabinde & Nkambule, 2025).

In such contexts, staffing patterns are not determined simply by the formal establishment of posts but also by practical considerations such as limited teacher availability or timetable constraints, with the result that teachers may be required to teach across multiple subjects or phases (Gustafsson, 2025; McPherson et al., 2025). Consequently, the needs of schools may not always be met by narrowly defined single-subject specialist appointments; instead, schools often require teachers with multiple subject specialisations to maintain curriculum coverage and ensure efficient utilisation of limited human resources (Gustafsson, 2025; Maharaj & Chauke, 2025). Furthermore, evidence suggests that rural schools are often required to adapt staffing arrangements to accommodate local realities, including shortages of teachers specialised in specific subject areas, fluctuating

enrolments, and constraints on teacher deployment (van der Berg et al., 2025; Sibuyi et al., 2024).

Due to the contextual realities reported in Limpopo, an examination of the alignment of the subject specialisation combinations produced by teacher education programmes with the needs of schools in this province could contribute to understanding the extent to which teacher preparation pathways align with the complex staffing demands that characterise many rural and under-resourced schooling contexts (DHET, 2015; Gustafsson, 2025). Furthermore, this gap is particularly significant in provinces such as Limpopo, where schools frequently operate under conditions of resource scarcity, multi-grade teaching, and limited staff complements (Castro et al., 2024; Kokela & Malatji, 2023).

In such contexts, schools often require teachers who can teach multiple subjects, resulting in a demand for flexible and hybrid subject specialisation combinations that may not be offered by university teacher training programmes (Castro et al., 2024; Hobbs & Porsch, 2021; Yu et al., 2023). Despite this, there is a lack of empirical research that has systematically analysed the relationship between teacher education outputs and school-level demand within specific provincial contexts.

This study addressed this gap by examining the alignment between the combinations of subject specialisations offered by the University of Limpopo and the subject combinations demanded by schools in Limpopo, using job advertisements as a proxy for labour market demand. Drawing on a dataset of advertised teaching posts, the study analysed the subject combinations required by schools and compared them with the subject specialisation combinations typically produced by teacher education programmes. In doing so, it provides a grounded analysis of labour market mismatch at the level of subject combinations, rather than relying on aggregate shortage indicators.

The study was guided by the following research questions:

1. What subject combinations are demanded for teaching posts advertised by schools in Limpopo?
2. What subject combinations are typically produced by teacher education programmes?
3. To what extent do these subject combinations align or diverge?
4. What are the implications of any identified mismatches for teacher employment and curriculum delivery in Limpopo schools?

By focusing on a single province, this study provided a contextually nuanced understanding of the teacher labour market, highlighting how local realities shape demand for teacher skills. It argues that the teacher labour market in Limpopo is characterised not merely by a shortage of teachers, but by structural mismatches in teachers' subject specialisation combinations, which has implications for both teacher employment and the effective delivery of the school curriculum. In doing so, the study contributes to broader debates on teacher education reform, labour market efficiency, and policy coordination in South Africa.

This study makes a specific contribution by shifting attention from aggregate data on teacher supply to the qualitative configuration of the combinations of subjects in which teachers specialise. The discourse on the shortage of teachers often focuses on whether enough teachers are being produced and pays less attention to whether the combinations of subject specialisations produced by teacher education institutions align with those required by schools. By using vacancy advertisements as evidence of revealed school-level demand, the study provides a practical labour-market lens for understanding how schools articulate their staffing needs.

The findings are useful for policy and practice because they can inform teacher education curriculum review, provincial teacher workforce planning, bursary prioritisation, and advocacy for stronger coordination between universities, the Department of Basic Education, and the Department of Higher Education and Training. In this way, the study provides evidence that can assist policymakers and teacher education institutions to move beyond broad shortage categories toward more precise, context-responsive planning.

2. Theoretical Framework: A Labour Market–Human Capital Perspective

This study integrated labour market theory and human capital theory to examine the alignment between the subject specialisation combinations that teachers are trained to teach and those demanded by schools. Using this analytical lens, we conceptualised the education system as a labour market ecosystem in which teachers are produced, configured as skill bundles, and absorbed into the schooling system based on demand. In this framework, universities function as producers of teacher supply, while schools represent sites of labour demand, and subject combinations constitute the core unit of analysis for determining alignment or mismatch. To operationalise this framework, we developed a Teacher Subject Combination Alignment Model (Figure 1), which visually represents the interaction between supply, human capital formation, and demand, as well as the outcomes of this interaction.

2.1 Labour Market Theory: Understanding the Dynamics of Supply and Demand

Labour market theory, which includes neoclassical approaches focusing on supply and demand, explains how workers are allocated to jobs where education influences labour market outcomes by affecting productivity and job access (Hinchliffe, 1987; McNabb, 1987). In the context of education, employment outcomes are shaped by the interaction between the supply of qualified teachers and the demand for specific skills by schools (Murshed, 2025; Samakao, 2025).

In this study, labour market theory provided the primary lens for analysing how teachers were distributed within the education system. The teachers ‘produced’ by universities through structured teacher education programmes constituted the ‘supply’, while the subject requirements stated in school job advertisements represented the ‘demand’. When the combinations of subject specialisations of the teachers produced by universities corresponded with those required by schools,

this constituted 'alignment', while divergence between these represented a 'mismatch'.

A key contribution of labour market theory to this study was its view of education as a positional good, where its value depends on relative standing in the labour queue rather than absolute productivity, especially in systems with weak vocational training (Stasio et al., 2016; van der Werfhorst, 2011). This informed the study's emphasis on skills matching, rather than focusing on numerical supply. This shifts the focus from the quantity of teachers available to the fit between their subject specialisation combinations and labour market needs, thereby providing a more nuanced understanding of teacher shortages as potential mismatches.

2.2 Human Capital Theory: Subject Combinations as Skill Bundles

In the context of education, human capital theory posits that education is an investment that enhances the productive capacity of individuals, thereby increasing their economic value and contributing to overall economic growth (Yujie, 2026). It assumes that acquiring knowledge and skills through education improves labour productivity, which in turn leads economic development at both individual and societal levels (Almendarez, 2013; Leoni, 2023). In this study, human capital theory complemented a labour market perspective by focusing on the skills, knowledge, and competencies that individuals acquire through education and training (Yujie, 2026). Teacher education programmes were understood as processes that produce specialised human capital, structured through subject combinations.

Rather than treating academic subjects as discrete units, we conceptualised subject combinations as bundles of human capital that determine a teacher's employability and value within the labour market. These bundles shape teachers' capacity to meet diverse classroom demands, particularly in under-resourced contexts such as Limpopo, where schools often require multi-subject teaching. From this perspective, the effectiveness of teacher education is determined not only by the production of qualified graduates but by the alignment of their skill configurations with school-level needs. Misalignment therefore reflects a situation in which the human capital produced does not correspond to labour market demand, resulting in inefficiencies in both employment and curriculum delivery.

2.3 The Teacher Subject Combination Alignment Model

To operationalise the synthesis of labour market theory and human capital theory as a theoretical framework, we modelled teacher subject combination alignment (**Figure 1**) to conceptualise the education system as a dynamic process consisting of three interconnected components: supply, human capital, and demand.

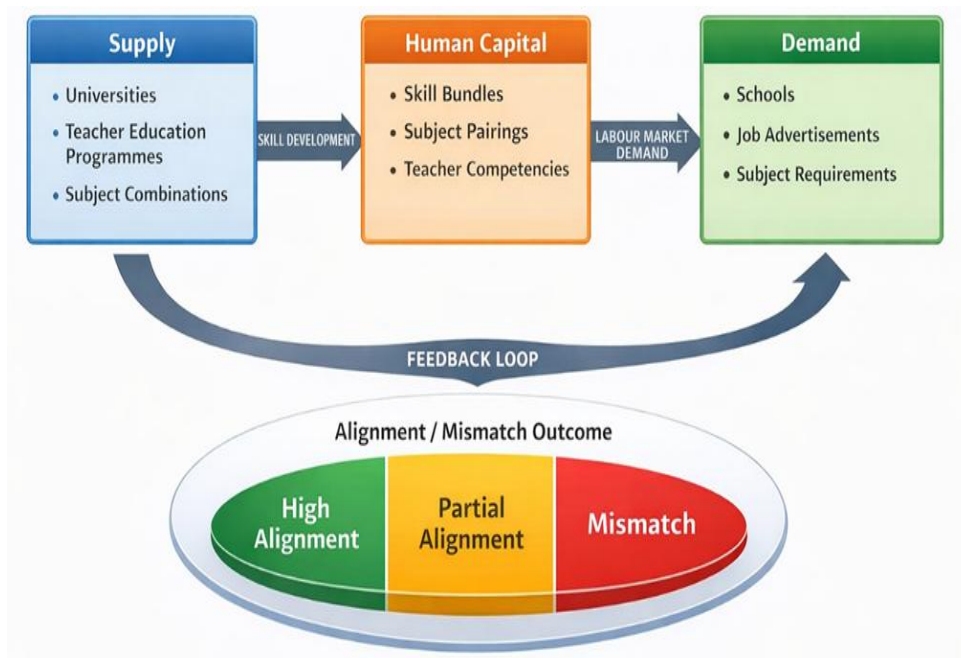


Figure 1: Teacher Subject Combination Alignment Model

2.3.1 Supply (Teacher Education Programmes)

Supply refers to the production of teachers by teacher education programmes, where subject combinations are structured and defined. Supply is thus understood not only in terms of the number of graduates, but in terms of the specific combinations of subjects in which they have specialised.

2.3.2 Human Capital (Skill Bundles and Competencies)

At the centre of the model is human capital, which reflects the transformation of subject combinations into marketable skills and competencies. These skill bundles determine teachers' employability, flexibility, and value within the labour market.

2.3.3 Demand (Schools and Job Advertisements)

The demand component represents the subject requirements of schools, as articulated through job advertisements. These requirements are shaped by contextual factors such as timetabling needs, curriculum demands, and resource constraints, often resulting in a demand for flexible and hybrid subject combinations.

The interaction between supply, human capital, and demand produces varying levels of alignment:

- High alignment: Direct correspondence between teacher training programme offerings and school requirements
- Partial alignment: Some overlap, with differences in subject pairings
- Mismatch: Little or no correspondence between supply and demand

The model emphasises that alignment is determined not merely by subject availability, but by the configuration of subject combinations.

2.3.4 Feedback Loop and System Responsiveness

A critical feature of the model is the feedback loop from demand to supply. Ideally, labour market signals should inform university programme design. However, where this feedback mechanism is weak, universities may continue to produce subject combinations that are misaligned with school needs, resulting in persistent structural mismatch.

This integrated framework is particularly suited to the context of Limpopo, where schools often operate under conditions that require multi-subject teaching and flexible staffing (Castro et al., 2024; Kokela & Malatji, 2023). By conceptualising subject combinations as the key unit of analysis, the framework enabled the study to move beyond the general discourse on the shortage of teachers and interrogate the specific aspect of subject specialisation mismatch in the teacher labour market. Furthermore, the framework provided a basis for analysing job advertisements as empirical expressions of labour demand, thereby grounding the study in real-world data. It also enabled a critical examination of how a teacher education programmes responded, or failed to respond, to these demands.

This study contributes to the literature by integrating labour market theory and human capital theory at the level of subject combinations, rather than aggregate supply and demand.

Specifically, it demonstrates that:

- Labour market demand in education is combinational and context-driven
- Human capital production is standardised and programmatic
- Mismatch arises at the interface between these two systems

The key conceptual contribution is therefore:

Teacher labour market mismatch is best understood as a misalignment in the configuration of competencies, not merely their availability.

In the South African context, the feedback loop between teacher supply and school demand is complicated by the fact that teacher education and school staffing are located in different—although interdependent—policy spaces. Teacher education qualifications are shaped primarily by higher education policy, institutional programme structures, and DHET requirements, while teacher demand is experienced at school level and mediated by the national and provincial education departments and school recruitment practices.

If communication between these two systems is ineffective, vacancy patterns and school-level subject-combination needs may not be considered in the design of teacher education curriculum. The feedback loop in the Teacher Subject Combination Alignment Model therefore points to a policy coordination challenge: the need for stronger mechanisms through which school-level labour-market signals inform teacher education planning.

3. Methodology

We employed a qualitative descriptive document analysis and comparative research design (see Ji, 2024; Bowen, 2009; Pagliarin et al., 2022; Cragun et al., 2016) to investigate the alignment between the subject specialisation combinations offered to students enrolled in the School of Education at the University of Limpopo and the school-level labour market demand in Limpopo. Using a multi-source documentary analysis approach enabled us to examine real-time labour market signals and institutional supply structures through the lens of labor market and human capital theories. The study was underpinned by this labour market analytical perspective, in which universities are conceptualised as producers of teacher supply, while schools represent demand through their recruitment practices. The study design enabled a comparison of data from these two domains to identify patterns of alignment and mismatch, particularly at the level of subject combinations.

3.1 Data Sources and Sampling

Data was gathered from two primary sources to represent the supply and demand components of the Teacher Subject Combination Alignment Model:

- *Demand-Side Data (Job Advertisements)*: A sample of teacher vacancy advertisements was collected from various schools across Limpopo. These advertisements represent revealed demand, indicating the subject specialisations required by the schools and additional subject expectations. Using purposive sampling, 56 teacher vacancy advertisements were selected based on the criteria that they were publicly accessible, the vacancies were at schools in Limpopo, and that they clearly stated the teaching phase, required subject specialisations, and other requirements of the post. The sample size was determined by the availability of complete and relevant vacancy documents during the data collection period, rather than on statistical sampling.

Since the study sought to examine alignment and mismatch at the level of subject combinations, only advertisements that explicitly indicated required subjects or teaching bundles were included. Advertisements that did not specify subject requirements or that lacked sufficient information for coding were excluded. This ensured that the sample was suitable for enabling a grounded understanding of revealed school-level labour market demand in Limpopo. The advertisements were drawn from vacancy notices available during the data collection period. Because some advertisements did not indicate posting dates, the study does not claim to represent all vacancies within a fixed annual recruitment cycle. This limitation is acknowledged in the study.

- *Supply-Side Data (University Curricula)*: Data on teacher education requirements were collected from the University of Limpopo Bachelor of Education (B.Ed.) and Post-Graduate Certificate in Education (PGCE) programme handbooks and faculty structures. These documents outline the standardised skill bundles – the subject specialisation pairings – produced by the institution. The University of Limpopo was used as the supply-side case

because it is a major teacher education institution that is located in the provincial context under investigation. Its teacher education programme structures thus provided a relevant example of local teacher preparation pathways for comparison with school-level demand in Limpopo in this investigation. The University of Limpopo is not the only supplier of teachers to schools in Limpopo, however: schools in the province may also recruit graduates from UNISA, the University of Venda, and other South African universities. The University of Limpopo is therefore treated as an illustrative supply-side case rather than representing the total provincial teacher labour supply.

3.2 Data Analysis

The data were analysed in four stages. First, all advertisements were screened to identify the phase, required subjects, additional teaching expectations, and any cross-disciplinary or phase-spanning requirements of the post. Second, the subject requirements were coded into demand categories, including linguistic hybrids, science and nature bundles, cross-disciplinary pairings, and multi-subject primary school bundles. Third, these school-level demand categories were compared with the subject specialisation combinations identified from the university teacher education offerings.

Coding was conducted by the first author and subsequently reviewed against the original documents to check for consistency between the extracted data, coding categories, and final interpretation. Consistency of coding was strengthened through repeated reading, category refinement, and an audit trail. Fourth, each comparison was interpreted using the Teacher Subject Combination Alignment Model and classified as high alignment, partial alignment, or structural mismatch. This process enabled us to identify not only whether particular subjects were available in teacher education programmes, but whether they were configured in ways that matched actual school-level demand.

To improve transparency, alignment was classified using three criteria. High alignment referred to cases where the subject combination required by the school corresponded directly to a subject bundle offered by the University of Limpopo. Partial alignment referred to cases where one or more required subject was present in the university offering, but not in the combination or phase configuration required by the school. Structural mismatch referred to cases where the school's required combination crossed disciplinary, faculty, or phase boundaries and was not available through the university's teacher education pathways. These categories were used to compare school-level demand with teacher education supply in a consistent and replicable manner.

This approach aligned data analysis with the research questions, as follows:

- **Typological Analysis (RQ1 & RQ2):** Content analysis was performed on the advertisements to create a typology of school demand (e.g., linguistic hybrids, stem pairings). Simultaneously, university offerings were categorised into institutional human capital bundles.

- Comparative Alignment Mapping (RQ3): A Mismatch Matrix was developed to explicitly pair school-level demand against university supply. Alignment was coded as High Alignment (direct correspondence), Partial Alignment (overlap with misconfiguration), or Structural Mismatch (divergence across disciplinary faculties).
- Theoretical Interpretation (RQ4): The resulting mismatches were interpreted using labor market and human capital theories to determine the implications for teacher employability and curriculum delivery at schools.

The study was limited by its reliance on publicly available vacancy advertisements. The advertisements did not necessarily represent all teacher vacancies in Limpopo Province, as some posts may be filled internally, advertised through informal networks, or communicated through channels not captured in the dataset. In addition, the vacancy advertisements varied in the level of detail they provided, which may have affected the depth of subject-combination coding. The study was also limited to a single provincial context and a single university supply-side case. The findings should therefore be understood as analytically transferable rather than statistically generalisable.

3.3 Trustworthiness and Rigour

To ensure the quality and rigour of the study, several strategies were employed. Credibility was enhanced through the use of real-world documents, including job advertisements and university prospectuses, as well as through triangulation of supply-side data (teacher education programmes) and demand-side data (school recruitment needs). Dependability was ensured by applying a consistent coding framework across all data sources and maintaining transparent analytical procedures throughout the study. Confirmability was strengthened by grounding all findings in documented evidence. Finally, transferability was addressed through a detailed contextual description of the province of Limpopo and the selection of teacher education structures that are commonly found in similar educational contexts.

3.4 Ethical Considerations

To ensure professional ethics and maintain the integrity of the participating institutions, the identities of all schools were protected by using alphanumeric identifiers (e.g., S-LP-01, P-LP-06) in place of their names. In addition, specific geographical markers were excluded from reporting. This protected the schools from reputational risk while allowing for phase-specific and provincial-level analysis.

The study had several limitations. The job advertisements may not have captured the full extent of teacher demand in the province, as not all vacancies were publicly advertised or consistently documented. In addition, there was variability in how subject requirements were specified across advertisements, which may have affected the precision of coding and categorisation. Despite these limitations, the dataset provided a robust and realistic representation of labour market demand, thereby enabling a meaningful analysis of alignment between teacher education and school-level needs. Furthermore, the university data that was used may not have provided a complete representation of all possible subject

combinations available within teacher education programmes – particularly where programmes may practice a degree of flexibility that was not reflected in the prospectus.

4. Findings and analysis

Analysis of the data collected from the University of Limpopo, which served as a case representing supply, and school advertisements, which represented, is presented in line with the first three research questions, which relate to the production of, and demand for, teachers with particular combinations of subject specialisations.

4.1 Subject Combinations Demanded in Advertised Teaching Posts in Limpopo Province

An analysis of the sample of 56 teaching post advertisements published by schools across Limpopo revealed that schools consistently demanded hybrid and multi-subject skill bundles. This demand was structured around the practical necessity of staffing schools with limited personnel, often requiring a single educator to cover diverse curriculum areas. Table 1 presents a summarised typology of the subject combinations demanded by schools; the full data set is provided in Appendix A.

The advertisements frequently framed subjects as combined teaching expectations attached to one post. For example, some advertisements required an educator with a language specialisation and a content specialisation, others required combinations of the subjects Mathematics, Natural Sciences, and EMS, or phase-spanning primary school teaching. This indicates that schools were not only seeking subject specialisation, but a practical bundle of teaching capacity that could meet local timetable and curriculum demands. These documentary patterns support the classification of demand into linguistic hybrids, cross-disciplinary pairings, science and nature bundles, and multi-subject primary school bundles.

Table 1: Typology of Subject Combination Demand in Schools

Category of Demand	Common Pairings (Skill Bundles)	Subject (Skill)	Phase Focus	Supporting Evidence (Advertisement confidential identifier)
Linguistic Hybrids	Sepedi HL + English FAL		Foundation & FET	<i>S-LP-02, S-LP-10, S-LP-19, S-MP-39</i>
Cross-Disciplinary Pairings	Mathematics + EMS; Geography + English; History + English		Senior & FET	<i>S-LP-02, S-LP-03, S-LP-05, S-LP-19, H-LP-34</i>
Science & Nature Bundles	Agricultural Sciences + Natural Sciences; Life Sciences + Geography		Senior & FET	<i>S-LP-01, S-LP-10, S-LP-14, H-LP-13, H-MP-37</i>
Multi-Subject Primary Bundles	English + Maths + Life Skills + NS/Tech		Intermediate & Foundation	<i>P-LP-06, P-LP-09, P-LP-18, P-LP-21, P-LP-27</i>

An analysis of the advertisements indicates that school demand in Limpopo was organised around combinations of subject specialisations and teaching bundles, rather than around single-subject specialisation. Table 1 provides empirical

evidence that the school labour market in Limpopo and surrounding regions was characterised by a demand for complex skill configurations. While some schools sought single-subject specialists, the majority of advertisements required educators trained to teach across multiple disciplines (e.g., *S-MP-39 required specialisation in Accounting and Sepedi*) or multiple phases (e.g., *P-LP-18 required Grade 4–7 coverage*). This reinforces the conceptualisation of subject combinations as integrated human capital bundles rather than as isolated skills. Across the dataset, the dominant pattern was bundled labour demand, in which schools articulated the need for teachers who could span multiple curriculum areas within one post.

Schools frequently paired a language with a social science or commercial subject, such as English and Geography (*S-LP-03, H-LP-34*) or Sepedi and Accounting (*S-MP-39*). Demand for Mathematics was often bundled with Physical Sciences (*S-LP-26, H-LP-23*) or Natural Sciences (*S-LP-05, S-LP-19*). Foundation Phase posts consistently required a four-subject bundle: Home Language, English FAL, Mathematics, and Life Skills (*P-LP-28, P-LP-29, P-LP-48*). Some primary schools required educators who were trained to teach a subject in both Intermediate and Senior phases; for example, teaching Mathematics for Grades 4 to 7 (*P-LP-35, P-LP-36*).

4.2 Combinations of Subject Specialisations Produced by the University of Limpopo

Table 2 outlines the subject specialisation combinations (supply) produced by the University of Limpopo. These represent the structured skill bundles or human capital configurations typically offered to students.

Table 2: Subject Specialisation Combinations Produced by the University (RQ2)

University Specialisation (Supply)	Specific Subject Pairings / Skill Bundles	Target Teaching Phase
Languages and Life Orientation	Life Orientation paired with English OR an African Language (Sepedi, Xitsonga, or Tshivenda)	Senior Phase (SP) & FET
Languages and Social Sciences	English OR an African Language paired with either Geography or History	Senior Phase (SP) & FET
Economics and Management Studies (EMS)	Accounting, Business Economics, or Economics paired with relevant commercial subjects	Senior Phase (SP) & FET
Mathematics, Science, and Technology (MST)	Mathematics, Physical Sciences, Life Sciences (Biology), and Technology	Senior Phase (SP) & FET
Foundation Phase Teaching	Integrated Literacy (Sepedi/English), Numeracy (Mathematics), and Life Skills	Foundation Phase (FP)
Advanced Certificate (ACE)	Specialisations in Grade R, Life Orientation (LO), Values and Human Rights (VHR), or MST	Context-specific
Post Graduate Certificate (PGCE)	Science and Mathematics, Languages and Life Orientation, EMS and Social Sciences	Senior Phase (SP) & FET

The university supply was characterised by a disciplinary logic where subjects were structured into rigid, predetermined bundles based on national policy frameworks like MRTEQ. Students were generally restricted to pairings within a specific department (e.g., Mathematics was paired with a Science, not History). This indicates that the university produced teachers through relatively structured and policy-compliant pathways, with specialisations grouped at cluster level rather than being endlessly customised to school vacancy patterns. In human capital terms, the university was producing recognisable skill bundles, but these bundles were configured academically and institutionally, rather than being tailored to the specific combinations required in school advertisements.

4.3 Alignment and Divergence Between School Demand and Teacher Supply

By comparing university offerings with school advertisements, a mismatch matrix emerged that identified significant structural divergences in the teacher labour market. This matrix (Table 3) serves as a grounded analysis of how teacher education aligned or failed to align with real-world staffing needs. Table 3 presents a summary of the matrix. The full data set is provided in Appendix B.

Table 3: Mismatch Matrix of Teacher Subject Combinations

School Code	Phase	School-Level Demand (The Required Bundle)	University Supply (The Bundle Produced)	Alignment / Mismatch Outcome
S-LP-02	FET	Mathematics + EMS	Separated into MST and EMS faculties	Structural Mismatch: Divergence between disciplinary faculties.
S-MP-39	FET	Accounting + Sepedi HL	Separated into EMS and Languages bundles	Structural Mismatch: Hybridisation requirements exceed disciplinary logic.
H-LP-34	FET	English + Geography	Produced within Languages & Social Sciences	High Alignment: Correspondence between university offerings and school demand.
S-LP-19	FET/SP	Geography + Natural Sciences	Geography in Social Sciences; NS in MST	Partial Alignment: Overlap exists, but subjects are paired across different tracks.
P-LP-35	Inter/Sen	Mathematics (Gr 4-7)	Specialised into either Intermediate or Senior phase	Structural Mismatch: Phase-span requirement vs. phase-specific training.
H-LP-53	FET	Economics + Tourism	Economics in EMS; Tourism often absent from core EMS bundles	Partial Alignment: The major subject is supplied, but the secondary advantage subject is a mismatch.
H-LP-23	FET	Math + Physical Science	Produced within MST track	High Alignment: Direct correspondence in a high-demand skill bundle.
P-LP-48	Found.	Sepedi + English + Maths + Life Skills	Integrated Foundation Phase curriculum	High Alignment: Strong correspondence in core primary competencies.

Comparing the data in Table 1 and Table 2 reveals varying levels of alignment within the teacher labour market ecosystem.

4.3.1 High Alignment

- Mathematics and Physical Sciences: Strong correspondence existed between university MST tracks and high school demands for pure science teachers (e.g., S-LP-26).
- Foundation Phase: There was generally high alignment in the subjects taught (Literacy/Numeracy), though schools demanded higher versatility in specific Home Language/English pairings.

4.3.2 Significant Mismatch (Divergence)

- The Disciplinary Gap: Schools demanded “*Maths and EMS*” (S-LP-02) or “*Accounting and Home Language*” (S-MP-39), yet these subjects were taught in different university faculties, creating a structural mismatch.
- The Language/Content Gap: Schools frequently required a language teacher to also teach a content subject like Geography or History. While “*Languages and Social Sciences*” was a university bundle, the specific pairings required by schools often fell outside the standard offerings.
- Phase-Span Divergence: Primary schools often advertised for teachers who could teach both Intermediate and Senior Phase grades (Grades 4-7), (P-LP-55, P-LP-35) whereas university production is increasingly specialised into either Intermediate or Senior Phase, limiting labour market flexibility.

Mismatch occurred primarily at the level of subject configuration rather than at the level of subject availability. In other words, the university enabled teachers to specialise in English, EMS, Mathematics, Geography, or Life Sciences teachers, but schools often demanded these in combinations that did not align neatly with how teacher education programmes packaged them.

4.4 Implications of Mismatch for Teacher Employment and Curriculum Delivery

The fourth research question explored the implications of the mismatches that had been identified for teacher employment and curriculum delivery at Limpopo schools. The findings indicate that subject-combination mismatch has implications both for teacher employment and for curriculum delivery. While novice teachers may hold recognised formal qualifications, they may encounter reduced employability if their subject combinations do not correspond with the combinations advertised by schools. While a graduate with specialisations in Mathematics and Physical Sciences may be well suited for posts requiring this combination, a graduate whose subjects do not match hybrid demands such as Mathematics and EMS or Accounting and Sepedi may be less competitive for such posts.

At the school level, a mismatch may affect curriculum delivery as the school may not be able to source teachers offering the exact combinations required for timetabling and workload allocation. As a result, the school may have to distribute subjects among existing staff, appoint teachers whose qualifications only partially match the post, or require teachers to teach outside their

specialisations. These practices may be especially consequential in resource-constrained schools where staffing flexibility is already limited. The findings therefore suggest that subject-combination mismatch is not only an employment issue but also a curriculum-delivery issue.

5. Discussion

The findings of this study provide an empirical basis for reconceptualising the teacher labour market in South Africa as a complex ecosystem defined by structural misalignment rather than simple numerical shortage. Employing the Teacher Subject Combination Alignment Model, the analysis reveals that the central issue was not a shortage of teachers, but the configuration of subject combinations as units of labour market exchange. This discussion interrogates the tensions between institutional production and school-level operational needs through the lenses of labour market theory and human capital theory.

The findings suggest that teacher education at the University of Limpopo is not completely disconnected from the needs of schools with regard to the combinations of subjects in which teachers specialise, but they are also not tightly synchronised. The system exhibits areas of meaningful overlap, yet the labour market increasingly rewards flexibility in subject bundling that is more granular than the current programme architecture always reflects. A key tension emerging from the findings is the divergence between the disciplinary logic of teacher education institutions and the contextual realities of schools. Universities structure teacher supply through fixed and standardised human capital bundles, such as Mathematics, Science and Technology (MST) or Languages and Social Sciences, which are shaped by internal disciplinary coherence and policy frameworks such as MRTEQ (Chinyama & Mpisi, 2025).

In contrast, schools – particularly in rural and resource-constrained contexts such as Limpopo – articulate demand in response to operational pressures, including limited staffing, multi-grade teaching, and timetable constraints (Castro et al., 2024; Kokela & Malatji, 2023; Tewari & Ilesanmi, 2020; Sithole & Khohliso, 2025). As reflected in the job advertisements, demand is organised around functional subject combinations, where one teacher is expected to cover multiple curriculum areas. This produces what can be described as a disciplinary-contextual gap, where institutional supply is rigid and structured, while demand is hybrid and adaptive.

The mismatch identified in this study should not be interpreted solely as a weakness of the university curriculum. It was also shaped by external contextual factors that influence how schools define their staffing needs. In Limpopo, many schools operate in rural and resource-constrained contexts where staffing complements are limited, and schools must organise teaching around available personnel rather than ideal subject-specialist models. This helps explain why advertisements frequently requested teachers who could teach across subject boundaries or phases. In such contexts, a school may prefer to appoint a teacher specialised in Mathematics and EMS, Accounting and Sepedi, or Natural Sciences and Geography – not because these combinations are ideal from a pedagogical

perspective, but because they are operationally useful for timetabling, workload distribution, and curriculum coverage.

The findings suggest that teacher supply and demand challenges in South Africa are not adequately captured by aggregate national teacher production figures alone. Rather, the evidence points to important mismatches across teaching phases, subjects and specialisations, where apparent overall sufficiency in teacher supply may conceal shortages in specific categories and surpluses in others. Recent analyses have shown that teacher workforce planning should move beyond broad estimates of graduate output and focus on specialisation-specific demand and absorption patterns within the schooling system (Gustafsson, 2025; Böhmer & Gustafsson, 2023). For example, while the overall supply of newly qualified teachers has at times approximated projected demand, substantial imbalances have persisted between primary- and secondary-level specialisations, highlighting the limitations of aggregate planning approaches.

This interpretation is consistent with policy and research evidence emphasising the need for more sophisticated teacher supply-and-demand planning. The Department of Basic Education has long recognised the importance of projecting teacher requirements and aligning educator provisioning with enrolment trends and system needs (Simkins, 2015; DBE, 2025). Similarly, the Teacher Demographic Dividend Project has highlighted the importance of improving the alignment between teacher graduate production, educator specialisations and future staffing requirements—particularly in light of anticipated retirements, provincial variations in demand, and ongoing challenges in the recruitment and deployment of appropriately qualified teachers (van der Berg et al., 2025). Collectively, these findings suggest that teacher workforce policy should prioritise aligning teacher production with specific areas of need rather than focusing solely on increasing the overall number of graduates.

The interpretation of the mismatch must also be read in light of the study's supply-side boundary. The University of Limpopo was used as a local institutional case, but it does not constitute the full teacher supply system for the province of Limpopo. A study including all institutions that produce teachers who consider posts in Limpopo could alter the degree of alignment identified in this study. Some mismatches may be reduced if other institutions offer more flexible or different subject combinations, while other mismatches may persist if teacher education programmes across the country follow similar disciplinary and phase-based structures. Therefore, the mismatch identified here should be understood as evidence of a configuration problem revealed by a single local supply-side case, rather than as a complete audit of all teacher supply to Limpopo schools.

The long-term implications are significant. If universities continue to produce teachers primarily within fixed disciplinary clusters while schools continue to demand flexible and hybrid subject bundles, graduates may experience delayed employment, underemployment, or pressure to teach beyond the bounds of their training. At the school level, the same mismatch may affect curriculum delivery,

as principals may be forced to allocate subjects to teachers based on staffing availability rather than on teachers' areas of specialisation. This could deepen educational inequality in under-resourced schools, where learners are more likely to experience inconsistent curriculum coverage and reduced access to specialist teaching. The problem is therefore not only a labour-market inefficiency – it is also a curriculum-delivery and equity concern.

This divergence between the supply and demand of teachers with specific combinations of subject specialisations was more pronounced when schools require combinations that cut across traditional university programme streams. Combinations such as Mathematics and EMS, or Accounting and Sepedi, reflected labour demands that did not align neatly with faculty-based or discipline-based training structures. This exposed a structural barrier within the system, as schools required forms of human capital that were not easily produced through the existing programme structures of the university. From a labour market theory perspective (Hinchliffe, 1987; McNabb, 1987), the advertisements posted by schools requiring teachers with specialisation in subjects from different disciplines represented real-time signals of demand, yet the persistence of demand for diverse combinations of subject specialisations suggests that these signals had not been fed back into programme design effectively.

Framing subject specialisation combinations as bundles of human capital enables deeper insight into the nature of this mismatch. Human capital theory posits that education enhances employability by equipping individuals with valuable skills (Almendarez, 2013; Leoni, 2023). However, the findings of this study demonstrate that employability is not determined solely by qualification level, but also by the specific areas of specialisation attached to that qualification. Certain combinations, such as Mathematics and Physical Sciences, retained high labour market value due to strong alignment between supply and demand – a finding consistent with existing literature on shortages of teachers with specific subject specialisations in South Africa (Mukhtar & Sumarti, 2025; Demapendan, 2024; Welter et al., 2022).

In contrast to the combinations of subject specialisations that were strongly aligned with the market requirements, other combinations fell into what may be described as a 'partial alignment trap' – where teachers' subject specialisations matched the demand of schools but not in the required combinations. For instance, teachers may specialise in Mathematics, EMS, English, Geography, Sepedi, or Accounting, and schools may also demand teachers specialised in these subjects. However, mismatch arises when schools require teachers with multiple subject specialisations in combinations that are not commonly produced in the existing teacher training structures. In such cases, the system has subject availability but lacks configuration alignment.

Recognising this trap is important because it explains why teacher shortages may persist even when teacher education institutions are producing graduates with the subject specialisations required by schools, but not the same pair of specialisations required by schools. This weakens the labour-market value of

some qualifications and may create inefficiencies in teacher deployment. The partial alignment trap therefore provides a conceptual explanation for how a teacher can be qualified but not optimally matched to advertised school needs.

The findings of this study affirm this interpretation as they demonstrate that labour market demand was concentrated on a limited number of teaching bundles, while teacher education supply remained distributed across broader academic clusters. This indicates that the labour market places a premium on flexibility within schools, where teachers are expected to operate across subject boundaries and, in some cases, teach outside their formal specialisation. Such expectations are rarely met by teacher education programmes, which continue to prioritise disciplinary coherence over contextual adaptability. This has resulted in a situation in which teachers possess valid qualifications, yet their human capital is not fully demanded in their local labour markets.

The persistence of hybrid and ad hoc teaching posts further points to a breakdown in the feedback loop between demand and supply. As demonstrated in this study, job advertisements function as immediate expressions of labour market needs, yet there is limited evidence that teacher education programme structures respond to these signals effectively. This represents a form of signal failure within the education system, where teacher education programme structures fail to respond to empirical data on demand in their approach to curriculum design. The consequence is a qualitative mismatch problem, where the system may produce sufficient numbers of teachers overall, but fails to produce the specific combinations required by schools. This aligns with international research suggesting that teacher shortages are often a function of misallocation rather than absolute scarcity (Mejia et al., 2025).

The implications of this mismatch extend beyond labour market inefficiency to include teacher employability and curriculum delivery. From an employment perspective, the findings suggest that graduates' access to the labour market is contingent upon the alignment of their subject specialisation combinations with high-frequency demand combinations. Those with combinations of specialisations that match labour market needs are more likely to secure employment, while others may experience delayed entry into the profession or be required to teach outside their areas of expertise. This highlights a critical limitation of human capital theory (Almendarez, 2013; Leoni, 2023) in its traditional form: investment in education does not automatically translate into employment unless the acquired competencies are aligned with demand.

At the level of curriculum delivery, the mismatch in subject specialisation combinations has direct consequences for teaching and learning. Where schools are unable to recruit teachers with the required combination of subject specialisations, they may be compelled to assign teachers subjects they are not specialised in, compromising the depth and quality of instruction. This could result in uneven curriculum coverage and contribute to persistent learning inequalities, particularly in already disadvantaged contexts. In this sense, subject-

combination mismatch is not merely an administrative or labour market issue; it is fundamentally a curriculum and learning issue.

Taken together, these findings challenge dominant narratives of teacher shortages in South Africa by demonstrating that the problem is not simply one of insufficient supply, but of misaligned configuration between supply and demand. The analysis therefore supports a reconceptualization of the teacher labour market from a quantitative deficit model to a configuration-based model, where the central question is not how many teachers exist, but whether the system produces the right combinations of skills for the contexts in which they are required.

This study thus contributes to the literature by foregrounding subject combinations as the critical unit of analysis and by demonstrating that labour market mismatch operates at a granular level that is often obscured in aggregate analyses. By integrating labour market theory and human capital theory as an analytical lens, the study provides a more precise understanding of how teacher supply and demand interact, and how alignment might remain uneven despite ongoing efforts to address teacher shortages.

6. Conclusion and Recommendation

This study examined the alignment between the combinations of subject specialisations available to students in the B.Ed. and PGCE programmes at the University of Limpopo and the school-level labour market demand in Limpopo, using job advertisements as a proxy for employer needs. By combining document analysis with descriptive quantitative (frequency) analysis, the study moves beyond discussions of teacher shortages that reference aggregate data to provide a granular understanding of supply and demand within the teacher labour market, with a focus on the combinations of subject specialisations demanded by schools and supplied by the university.

The study found that the teacher labour market in Limpopo was characterised not by a simple shortage of teachers, but by a structural mismatch in the supply and demand of subject specialisation combinations. This finding reframes the teacher shortage discourse by shifting attention from quantity to configuration, highlighting that the issue lies in how teacher competencies are bundled and deployed, rather than in their overall availability. While the study did not provide a complete audit of the supply of teachers in Limpopo, by comparing 56 vacancy advertisements with one local teacher education supply-side case it demonstrates that subject-combination mismatch can be identified at the level of how teacher skills are configured. The findings lay the groundwork for further multi-institutional and multi-provincial research into the alignment of teacher education programmes with the needs of schools.

The findings of this study have implications for teacher education policy, programme design, labour market coordination, and school-level practice. The following recommendations are made.

6.1 Reconfigure teacher education programmes toward flexible subject combinations

Teacher education institutions should move beyond rigid subject clustering and introduce greater flexibility in subject combination choice. This could include:

- Allowing students to select context-responsive subject pairings
- Introducing modular or elective-based combination pathways
- Designing programmes that reflect common labour market bundles identified through empirical data

Such reforms would align human capital production more closely with labour market realities, improving graduate employability.

6.2 Strengthen labour market intelligence in teacher education planning

There is a need to institutionalise the use of labour market data (e.g., job advertisements) in the design and review of teacher education programmes. Universities and policy bodies should:

- Regularly analyse vacancy data to identify high-frequency subject combinations
- Use this data to inform programme offerings and specialisation pathways
- Establish mechanisms for continuous feedback between schools and universities

This would strengthen the feedback loop within the education labour market system.

6.3 Prioritise high-demand subject combinations in funding and policy

Policy interventions should extend beyond subject-specific shortages to include subject combination priorities. For example:

- Bursary schemes (e.g., Funza Lushaka) should prioritise high-frequency combinations, not only individual subjects
- Incentives should be provided for training in multi-subject configurations aligned with school demand

This would ensure that resource allocation reflects actual labour market needs, rather than broad disciplinary categories.

6.4 Enhance teacher adaptability through curriculum design

Teacher education programmes should explicitly prepare graduates for multi-subject teaching environments, particularly in rural and under-resourced contexts. This may involve:

- Integrating cross-disciplinary teaching competencies
- Providing training in curriculum integration and flexible teaching strategies
- Expanding practical teaching experiences across multiple subject areas

Such approaches would improve the functional adaptability of teachers, aligning their capabilities with school-level expectations.

6.5 Improving coordination between higher education and basic education sectors

The findings highlight the need for stronger coordination between:

- The Department of Higher Education and Training (DHET)
- The Department of Basic Education (DBE)
- Teacher education institutions (universities)

This coordination should focus on:

- Aligning programme design with curriculum demands
- Joint planning of teacher supply based on provincial needs
- Developing integrated strategies for teacher workforce planning

Improved coordination would reduce systemic fragmentation and enhance alignment across the education system.

6.6 A Realistic Pathway to Implementation

The implementation of flexible subject-combination pathways as recommended may be constrained by accreditation requirements, university faculty structures, staffing capacity, timetabling arrangements, and national teacher education policy frameworks. For this reason, reform should not be approached as immediate, wholesale restructuring. A more realistic strategy would be to begin with periodic analysis of provincial vacancy data, followed by targeted curriculum review in high-demand combination areas. Universities could introduce elective pathways or endorse additional specialisations in recurring shortage combinations, while the DBE and the DHET could use vacancy evidence to guide bursary priorities and teacher workforce planning. Such a phased approach would allow teacher education institutions to become more responsive to school labour-market demand without undermining programme coherence or policy compliance.

6.7 Implications for further research

Future research could extend the scope of this study to multiple provinces to examine regional variation. It could investigate how subject combination mismatch affects teacher deployment and retention. Further research could also explore the relationship between subject combination alignment and learner outcomes. Additionally, longitudinal studies could examine how alignment evolves over time in response to policy changes. Future research should also include multiple teacher education institutions and official graduate-output data to provide a broader picture of provincial teacher supply.

This study demonstrates that understanding teacher labour markets requires moving beyond aggregate indicators toward fine-grained analyses of how skills are configured, demanded, and deployed. By foregrounding subject combinations as the key unit of analysis, the study provides a more precise and actionable understanding of alignment between teacher education and school needs. Ultimately, improving the effectiveness of the education system in contexts such as Limpopo will depend on the extent to which teacher preparation is not only sufficient in quantity, but also appropriate in configuration.

Conflict of Interest

The authors declare no competing interests.

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