Tackling the Gender Gap in VET: From Awareness to Structural Change through a UDL Framework

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Introduction: Beyond Numbers – Understanding the Gender Gap in VET

Despite decades of policy commitments and gradual progress toward gender equality, vocational education and training (VET) systems across Europe continue to reproduce deeply entrenched gender patterns. These patterns are not only numerical—in the form of overrepresentation or underrepresentation of one gender in specific tracks—but also structural, symbolic, and intersectional.

According to recent Eurostat-based data (Cedefop, 2025), male students make up approximately **93% of engineering** and **87% of architecture and construction** graduates in upper-secondary VET across the EU, highlighting a profound gender imbalance in these sectors (but according to CEDEFOP female percentage in educational VET programmes is 96.3%). These figures, however, only scratch the surface. The European Institute for Gender Equality (EIGE, 2024) warns that occupational gender segregation in VET reflects and reinforces broader inequalities in labour market participation, wage levels, and career progression.

Moreover, gender disparities in VET intersect with other axes of inequality. Students from **low socioeconomic backgrounds**, **migrant families**, or **rural areas** are more likely to be channelled into narrow, gender-typical vocational tracks with limited progression. Girls with disabilities or from ethnic minorities face compounded disadvantage due to both gendered expectations and systemic exclusion mechanisms.

The issue is further complicated by symbolic and cultural factors. **Gender norms**, often internalized by adolescence, shape the aspirations and self-perceptions of young learners. As **Cedefop (2025)** notes, guidance counselling and tracking decisions are rarely neutral: educators, parents, and institutional systems all play a role in reproducing gendered pathways. Finally, technological change is reshaping the labour market, making it all the more urgent to ensure that VET provides equitable access to future-oriented careers. Yet **OECD (2023)** data reveal that despite high academic attainment among girls, they remain largely absent from digital, AI-related, and high-wage technical fields—a gap that vocational pathways could help bridge if properly reformed.

So, if your professional role places you among those with the power to shape educational or training practices—whether you are a teacher, trainer, school leader, policy-maker, or involved in career counselling or labour market integration—then you carry a shared responsibility to confront the persistence of gendered norms within VET systems.

You may ask: Why should we actively counterbalance the traditional gendered orientation that continues to exclude or discourage girls and women from certain VET pathways? Is it merely a trend driven by political correctness? The answer is no—it is a moral, political, and epistemic imperative.

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Morally, it is untenable to uphold systems that constrain individual potential based on gender. As Nussbaum (2011) argues in her capabilities approach, justice requires that each person be afforded the freedom to pursue a life they have reason to value—including access to a full range of educational and vocational opportunities.

Politically, democratic societies depend on the full participation of all citizens. Gendered exclusion undermines not only individual rights but also collective social and economic resilience. Sen (1999) reminds us that development is based on freedom: a society thrives when all its members can contribute according to their capabilities.

Epistemically, we must challenge the assumption that gender inherently determines learning capacity, cognitive ability, or academic performance. While educational outcomes do often differ by gender, these differences are not the result of innate intellectual traits, but rather of socio-cultural, behavioural, and contextual factors. In fact, across most educational systems, girls tend to outperform boys in school achievement, even if the effect size is relatively small.

A landmark meta-analysis by Voyer and Voyer (2014), based on 502 effect sizes from 369 samples, confirmed a small but consistent female advantage in school marks across all levels of education and most subjects. This advantage was most pronounced in language courses and smallest—but still present—in mathematics. Importantly, the study showed that the female advantage in grades has remained stable over time, contradicting the narrative of a recent "boy crisis" in education. The authors also found that contextual factors such as race, gender composition of samples, and national setting significantly moderated the size of the effect, further underscoring the non-biological nature of the differences.

Supporting this, Marcenaro–Gutierrez et al. (2018) showed that gender differences in achievement among adolescents can largely be explained by differences in responsiveness to future expectations, socioeconomic background, and behavioural profiles. Girls are more motivated by long-term goals, while boys' performance is more contingent upon family conditions and more likely to be disrupted by misbehaviour—again, socially constructed variables.

As Halpern (2012) and the OECD (2015) also make clear, no credible body of cognitive science supports the idea that boys and girls differ systematically in intellectual ability or potential. Differences in achievement arise from differential treatment, expectation, and environment—not capacity.

Thus, when VET systems are redesigned through inclusive, learner-centred pedagogies that account for individual differences without presuming gendered abilities, the outcome gap can be eliminated. In short: gender differences in results are engineered, not innate.

The Persistence of Gendered Norms in the Age of Equality

Recent research has revealed a striking and counterintuitive trend: in countries with high levels of gender equality and socioeconomic development, gender segregation in educational and occupational choices is often more pronounced. This pattern, referred to as the **"gender-equality paradox"**, has been systematically reviewed by **Herlitz et al. (2025)**, who confirm its empirical robustness across multiple domains, including personality traits, academic preferences, and field-of-study choices. In contexts where institutional barriers are lower, men and women appear to self-select into different career paths with even greater consistency, especially in STEM and care-related fields.

But how can increased freedom lead to greater divergence? One influential explanation comes from **Breda et al. (2020)**, who argue that the paradox can be fully accounted for by the persistence—and in some cases, intensification—of **essentialist gender stereotypes**, particularly the belief that mathematics is "not for girls." Using cross-national data from over 300,000 15-year-old students across 64 countries, the authors show that this stereotype is **more prevalent and more internalized in developed and gender-egalitarian countries**, and that it correlates strongly with female underrepresentation in math-intensive fields. In other words, development may loosen economic constraints, but **it does not automatically dismantle cultural narratives about gender and competence**. On the contrary, it can allow them to express themselves more freely.

Historical evidence from **post-Soviet Russia**, as documented by **Rudenko et al. (2022)**, offers a powerful case in point. During the late Soviet era, state-driven policies promoted gender equality in engineering and other technical professions, creating one of the world's most balanced STEM labour forces. However, the collapse of the USSR and its ideological framework led to a **rapid remasculinization of engineering**, with a sharp drop in women's participation. The study reveals that after the fall of Soviet institutional support, traditional gender norms quickly resurged, leading to intensified horizontal and vertical segregation in both higher education and employment. The **so-called "gender equality paradise" proved to be fragile**, sustained more by structural compulsion than by internalised norms of parity.

Taken together, these findings suggest that **gender inequality in vocational and technical education cannot be addressed solely by expanding rights or economic opportunity**. Deep-seated cultural beliefs, historically contingent institutional legacies, and persistent symbolic associations continue to shape how young people navigate educational and career choices. Thus, **policy interventions must go beyond providing access: they must directly challenge the gendered assumptions embedded in educational practices, counselling systems, and societal expectations**.

It is essential to emphasize that any given gender difference in educational outcomes or VET pathways choice are **statistical averages**, not biological laws. Saying that girls slightly outperform boys in school does not mean that *any given girl* will perform better than *any given boy*. These findings describe **population-level tendencies**, not individual destinies—and must never be used to justify educational expectations, guidance, or opportunities based on gender. The fact that girls tend

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to do slightly better in school than boys does not mean that your daughter will necessarily outperform your son. These are trends, not biological rules.

One pedagogical evidence for adopting gender equality in educational pathways

Mastery learning offers a compelling strategy for **neutralizing gender-based performance differences**. Rooted in Bloom's seminal work (1968), this approach ensures all students receive the tailored instruction, sufficient time, and corrective feedback necessary to achieve mastery. Research in educational psychology has repeatedly shown that such structured and scaffolded learning environments **reduce performance gaps** between students with diverse initial competency levels—gaps that often correlate with socio-cultural and gendered influences.

Although direct studies on **gender differences within mastery learning** are scarce, the underlying mechanism supports the hypothesis that **when instructional equality is maximized—and pacing is individualized—gender differences in outcomes effectively disappear**. This aligns with findings from instructional scaffolding research, where performance disparities related to socioeconomic background and educational history are significantly reduced in personalized learning settings.

Empirical research supports the hypothesis that mastery learning can eliminate gender-based differences in academic achievement. For instance, a study by **Pepple (2014)** found **no significant difference** in chemistry achievement between male and female students taught using mastery learning methods in Nigerian urban schools. This suggests that, when instruction is structured around formative assessment and differentiated pacing, **gender ceases to be a meaningful predictor of outcomes**.

Universal Design for Learning: A Framework for Structural Change

If we accept that gender disparities in VET are not rooted in innate differences but are socially constructed and structurally reinforced, then pedagogy must become a site of transformation. This requires moving beyond compensatory or add-on strategies—such as targeted encouragement for girls in STEM—and toward systemic approaches that redesign the learning environment for equity from the outset. **Universal Design for Learning (UDL)** offers such a framework.

Originally developed to improve access for students with disabilities, UDL has evolved into a comprehensive educational philosophy that promotes inclusion through **flexible goals, materials, methods, and assessments**. Rather than adapting instruction for exceptional learners, UDL begins by recognizing that **variability is the norm**, and thus designs environments that anticipate and respond to diversity in all its forms—including gender.

UDL stems from a simple but revolutionary idea: **if learners differ in their cognitive styles, experiences, interests, and needs, then learning environments must be designed to reflect this**

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diversity from the outset—not retrofitted once exclusion occurs. The goal is not to ask students to conform to instruction, but to shape instruction to be accessible to all.

The term "universal design" was originally coined in architecture to describe the creation of physical spaces usable by everyone, regardless of physical ability. From the 1990s onward, scholars and research centers such as CAST (Center for Applied Special Technology) began adapting this logic to education, proposing a theoretical and operational structure for instruction that is universally accessible.

UDL is built around three key principles, each aligned with a domain of brain functioning identified through cognitive neuroscience (CAST, 2024):

1. Multiple means of representation ("what of learning"): ensuring that content is delivered in diverse ways that are responsive to learners' sensory, linguistic, cultural, and cognitive profiles. This includes the use of text, audio, video, images, digital tools, and augmented reality.
2. Multiple means of action and expression ("how of learning"): allowing students to demonstrate their understanding in various modes—written, oral, manipulative, or digital—while fostering executive function and self-regulation.
3. Multiple means of engagement ("why of learning"): tapping into students' intrinsic motivation through choice, collaboration, social interaction, personal relevance, and a sense of belonging. Without meaningful engagement, deep learning cannot occur.

These principles are articulated into nine guidelines and 31 "checkpoints" that serve as an evidence-based design matrix for inclusive pedagogy. The teacher is expected to use them flexibly, adapting them to the classroom context, learning objectives, and student characteristics.

The paradigm shift that UDL proposes is both methodological and ideological: it moves away from a "one-size-fits-most" model with exceptions, and instead builds the educational environment on the assumption of pervasive diversity. In this way, UDL is not the same as differentiation or personalization: it does not multiply individualized strategies, but builds a systemic infrastructure where everyone has multiple valid access points to learning.

It is a proactive and anticipatory pedagogy, not a reactive one. This marks a decisive rupture with traditional special education models, which—even in their most enlightened forms—were still based on diagnosis and individualized correction.

The effectiveness of Universal Design for Learning (UDL) is increasingly supported by empirical research that highlights its impact on student participation, motivation, and—more recently—on measurable learning outcomes. This positions UDL not only as an inclusive theoretical framework but also as an evidence-based instructional strategy.

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A review by Capp (2017), synthesizing 18 studies published between 2013 and 2016, observed that Universal Design for Learning (UDL) consistently improved aspects of the learning process—particularly in terms of student engagement and accessibility. However, the review found limited evidence regarding UDL's direct impact on academic achievement and called for more rigorous experimental research to clarify its effect on standardized outcomes. A subsequent meta-analysis by Baybayon (2021), based on seven peer-reviewed studies from 2012 to 2018, reaffirmed UDL's positive influence on student engagement, performance, and perceptions of learning. The most substantial benefits were linked to the principle of multiple means of representation, though the study similarly highlighted methodological limitations and the need for more robust designs. Addressing these gaps, a more recent meta-analysis by Almeqdad et al. (2023), which included 13 quantitative studies, reported a statistically significant average effect size ($g = 3.56$). Their findings point to improvements in learner motivation, inclusion, and engagement across diverse student populations, including both those with and without disabilities—thus reinforcing the universal applicability of the UDL framework.

A recent systematic review by Bray et al. (2023) confirms that UDL has been most effectively implemented in the area of multiple means of representation, particularly in technology-rich environments where students can access content in formats such as video, text, audio, and interactive media. However, the review also highlights a relative weakness in the operationalization of the second and third principles—action and expression, and self-regulation—which are less consistently embedded in instructional practice. This imbalance suggests that while learners increasingly benefit from diverse ways of receiving information, they still face limitations in how they express knowledge or manage their own engagement.

Strengthening these areas—especially through intentional support for executive function, metacognitive strategies, and expressive flexibility—remains a critical next step in realizing UDL's full transformative potential.

When applied to VET systems, UDL becomes a powerful instrument for counteracting the educational burden imposed by traditional gender norms on girls and women. It opens up the possibility of designing training pathways that do not merely "accommodate" female students, but actively dismantle structural and symbolic barriers to their participation and success.

To make this vision operational in the context of gender-transformative VET reform, we propose a strategic framework structured around three interdependent dimensions:

- Raising awareness of systemic gender bias in guidance, pedagogy, and institutional cultures;
- Presenting evidence to inform inclusive, data-driven redesign;
- Promoting good practices that illustrate what UDL looks like in action across sectors and countries.

These dimensions do not supplement UDL—they activate it. They offer a pragmatic roadmap for translating theory into structural change.

From Principles to Practice: A Full UDL Example in Mechatronics VET

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Module: *Designing and Assembling an Electromechanical Transmission System*
Target learners: First-year VET students in a mixed-gender mechatronics track
Duration: 20 hours (10 theory + 10 lab)
Challenge: Strong gender imbalance (90% male), limited prior exposure to mechanical systems for many female students, risk of disengagement or dropout due to perceived irrelevance or intimidation.

UDL Principle	Guideline (CAST)	Checkpoint	Gender-Responsive Value
Representation	1.1 Customize the display of information	Offer content in multiple formats: 2D technical drawings, 3D CAD models, annotated photos	Reduces disadvantage for girls with less prior exposure to mechanical schematics; fosters visual confidence
Representation	1.2 Offer alternatives for auditory/visual information	Use subtitled videos, multilingual glossaries, narrated slides	Supports non-dominant language speakers, including many migrant-background girls; avoids single-channel bias
Action & Expression	4.1 Vary methods for response and navigation	Allow final project to be presented via physical demo, video, or oral explanation	Empowers students who may be less confident in written tech jargon (often girls); highlights hands-on competence
Action & Expression	6.3 Facilitate managing information and resources	Provide scaffolded lab templates and personalized planning guides	Strengthens self-regulation and task orientation; supports girls less familiar with tool-based workflow
Engagement	7.2 Optimize relevance,	Assign a real-world project	Increases engagement for

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	value, and authenticity	(e.g., hybrid harvester part or mobility device)	girls by connecting mechanics with social utility and community impact
Engagement	8.3 Foster collaboration and community	Use rotating roles in mixed-gender teams (designer, builder, documenter, tester)	Disrupts gendered task expectations; builds leadership and technical identity across genders
Engagement	9.3 Develop self-assessment and reflection	Introduce "learning log" with reflective prompts after each session	Helps all students—especially girls—track confidence, persistence, and role evolution in STEM contexts

Raising Awareness

The first step toward structural change in vocational education and training (VET) systems is not merely technical—it is cultural. Raising awareness entails making visible the often-invisible mechanisms through which gender stereotypes shape expectations, educational guidance, learning environments, and institutional norms. These mechanisms operate at multiple levels: interpersonal (in classroom interactions), organisational (through tracking and placement procedures), and systemic (via curriculum, policy, and resource allocation). Awareness, therefore, is not a moral accessory to reform; it is its epistemic precondition.

Numerous studies have demonstrated that educational actors—including teachers, counsellors, and administrators—often carry unconscious biases about gender roles in vocational subjects. These biases can influence how students are mentored, evaluated, or encouraged to pursue certain tracks (Cedefop, 2023). Girls are more likely to be nudged toward caregiving professions, while boys are disproportionately directed toward technical or high-wage sectors, regardless of individual aptitude or interest. These patterns are not random—they are culturally scripted and institutionally reproduced.

Research by UNESCO-UNEVOC (2020) and the OECD (2023) shows that early career guidance, when insufficiently reflective of gender dynamics, can reinforce segregation and limit students' perceived options. Moreover, guidance systems that operate in the absence of disaggregated data or diversity-oriented training tend to reproduce the very inequities they aim to mitigate. This is why interventions must begin by educating the educators—not only about the existence of gender disparities, but about how their own practices may unintentionally sustain them.

Awareness-raising must also target symbolic structures. As Bourdieu (2002) argued, symbolic violence—such as the normalisation of male dominance in technical fields—operates by being misrecognised as natural. In the context of VET, the persistence of gendered divisions of labour is often accepted as the result of "choice," without examining how these choices are structured by institutional design, social expectations, and the internalisation of limiting norms.

UDL can serve as a tool for critical consciousness. By requiring instructors to anticipate and address learner variability from the outset, UDL makes it harder to ignore the structural disadvantages that certain groups—especially girls—face in specific fields. For example, asking teachers to represent content through multiple modalities may reveal the tacit assumptions about who is presumed to already "understand" a technical diagram or a machine's structure. In this sense, UDL-informed training becomes not only inclusive but also reflexive, prompting educators to interrogate the normative foundations of their pedagogical routines.

Raising awareness is not about assigning blame; it is about illuminating patterns. It involves building a shared vocabulary, supported by data and reflection, that enables institutions to talk meaningfully about gendered disadvantage. Without this foundation, even the best-designed reforms risk remaining superficial—well-intentioned but ultimately ineffective. Awareness, then, is not a preliminary gesture; it is the beginning of pedagogical and institutional accountability.

Presenting Scientific Evidence

If raising awareness sets the stage for change, presenting robust and accessible empirical evidence provides the rationale for its urgency and guidance for its implementation. In vocational education and training (VET), data do more than reveal disparities—they dismantle myths that associate gender with competence, interest, or employability in specific sectors.

A field experiment in Malawi by Cho et al. (2013) showed that vocational training improved outcomes for both genders, but structural barriers limited women's ability to translate those gains into earnings. In Switzerland and Bulgaria, Heiniger and Imdorf (2018) found that gendered VET pathways reinforced occupational segregation, contributing to the persistence of inequality across the education–employment nexus. Reisel et al. (2015) describe VET systems as "sorting machines" that channel students into gendered tracks, reproducing disparities in income, autonomy, and status.

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Similarly, Fuller and Unwin (2013), studying the English apprenticeship system, note that although access for women has improved, they remain overrepresented in low-wage, low-progression sectors such as childcare and beauty. The authors call for early, multi-level interventions that challenge normative expectations and actively support non-traditional career choices.

Recent contributions by Fischer-Browne et al. (2024) and Beckmann et al. (2023) show that students whose choices are misaligned with their personal interests or with traditional gender norms face significantly higher dropout risks—particularly girls. These findings underline the need to design systems that not only provide access, but align with learners' self-concepts, motivations, and identity development.

Gensch and Figueiredo (2021) argue forcefully that access alone is insufficient. If vocational education is not paired with systemic, context-sensitive measures—such as differentiated guidance, inclusive pedagogies, and supportive assessment structures—it risks reinforcing rather than reducing inequality. The OECD (2023) also underscores the need for impact assessments and gender-disaggregated data as tools for identifying and addressing structural bias in VET.

This need is particularly acute in STEM-related vocational fields. UNESCO-UNEVOC's global report (2020) highlights a persistent "leaky pipeline": girls perform equally well in science yet remain underrepresented in STEM-TIVET programmes and rarely transition into related careers. The causes are not biological, but institutional, cultural, and symbolic. Gendered social norms, blind spots in data, and the lack of inclusive role models all contribute to attrition.

The so-called "gender-equality paradox" further complicates the picture. Breda et al. (2020) demonstrate that stereotypical beliefs associating mathematics with masculinity are more widespread—and more internalised—in wealthy, gender-egalitarian countries. These stereotypes, not innate differences, predict girls' avoidance of math-intensive fields. Thus, development and gender parity in rights do not automatically eliminate biased norms. On the contrary, they can provide more latitude for stereotype-consistent "choices."

Evidence matters not only for diagnostic purposes but also for legitimacy. Data link gendered VET pathways to lifelong income gaps, reduced mobility, and systemic inequality. They expose how seemingly neutral policies and practices perpetuate disadvantage—and provide the empirical grounding for reform.

In this light, Universal Design for Learning (UDL) emerges as a framework that operationalises inclusion. It embeds data-driven responsiveness into curriculum design, pedagogy, and assessment. UDL asks not whether students are "ready" for the system, but whether the system is ready for the students. It shifts evidence from a reactive tool to a proactive strategy—capable of reshaping how opportunity is understood, distributed, and supported.

Promoting Good Practices

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After raising awareness and presenting evidence, the final step is identifying, sharing, and scaling up good practices—concrete strategies and interventions that demonstrate how Universal Design for Learning (UDL) can reshape vocational education and training (VET) in ways that are gender-transformative, structurally inclusive, and pedagogically sound.

Good practices are not mere anecdotes of success; they are testable, replicable models grounded in real-world implementation. They make abstract principles actionable. As such, they offer educators and institutions not only inspiration but also guidance.

Cedefop (2023) has compiled national success stories that show how intentional design, inclusive pedagogy, and gender-sensitive career guidance can reduce gender segregation in VET. One example includes projects that pair female students with role models in non-traditional sectors, increasing retention and reshaping perceptions of what is “appropriate” or “possible.” Another success factor is the early integration of gender awareness training into teacher professional development—ensuring that VET instructors are not only skilled in technical content but also in the cultural and pedagogical dimensions of equity.

The Swiss TREE panel survey (Hupka-Brunner & Meyer, 2023) reinforces this by documenting how inclusive learning environments, relational support structures, and visibility of diverse career trajectories positively influence both student retention and occupational mobility. These interventions are not simply "add-ons" but embedded features of educational ecosystems that acknowledge learner variability as a systemic design factor.

From the UDL perspective, good practices often align with the three core principles:

- Multiple means of representation: In VET contexts, this could mean teaching a technical concept through visual schematics, hands-on modeling, augmented reality simulations, and verbal explanation—ensuring accessibility to students with different sensory, linguistic, or educational backgrounds.
- Multiple means of action and expression: Allowing students to demonstrate competence in various forms—e.g., performing a task, producing a report, or collaboratively solving a problem—can accommodate gendered variations in communication norms or prior learning histories without stereotyping.
- Multiple means of engagement: UDL-informed VET modules include mechanisms to foster intrinsic motivation through culturally relevant content, social belonging, and personal relevance. This is particularly crucial for female students entering male-dominated sectors, who often face implicit messages of non-belonging.

One example of UDL-informed good practice might be the redesign of a mechatronics module (see example earlier in this report) where all 31 UDL checkpoints are actively engaged, including the

integration of tools that support executive function (e.g., planning templates), culturally inclusive case studies, and assessments adapted to varied expressive styles.

Moreover, **policy-level interventions** also qualify as good practices when aligned with UDL logic. The OECD (2023) highlights the effectiveness of reforms such as pay transparency, inclusive curricula, and restructuring of career guidance services to emphasize interest and aptitude over stereotype-congruent pathways. These policies act as "architectural scaffolds," reshaping the terrain on which educational choices are made.

Finally, UNESCO-UNEVOC (2020) reminds us that good practice must include **systematic visibility** of underrepresented groups: girls succeeding in STEM, migrant youth in leadership roles, or students with disabilities in high-tech fields. Visibility normalises diversity. It converts the exceptional into the expected.

In sum, good practices translate awareness and evidence into design. They demonstrate that gender-inclusive VET is not an idealistic vision but a feasible outcome—one that becomes likely when pedagogy, structure, and policy operate in alignment. When embedded within a UDL framework, good practices not only improve individual outcomes; they begin to shift the culture of vocational education itself.

Future Research Directions

The insights presented in this paper suggest several promising avenues for further research aimed at reducing gender disparities in VET through pedagogical innovation and systemic change. First, there is a pressing need for **longitudinal intervention studies** that implement UDL-based curricula within vocational tracks and evaluate their impact through **pre- and post-testing** designs. Such studies should assess not only academic achievement but also learner motivation, self-efficacy, persistence, and identity development—particularly among underrepresented groups, including girls in male-dominated sectors.

Second, comparative research across **different national VET systems** could provide insight into how structural variables—such as funding models, tracking mechanisms, and teacher training—mediate the effectiveness of UDL implementation. Understanding the conditions under which UDL yields the strongest equity outcomes would support more context-sensitive reforms.

Third, the intersection of UDL with **career guidance practices** warrants specific attention. Future studies might explore how integrating UDL principles into guidance tools and processes affects students' career choices, particularly in terms of alignment with personal interests and disruption of gender-typical trajectories.

Finally, there is an opportunity to investigate how **digital technologies**—including adaptive learning platforms, augmented reality, and AI-based feedback systems—can be harnessed within a UDL

framework to enhance access, representation, and engagement in VET. These tools may be particularly powerful in creating inclusive, gender-responsive learning environments when intentionally aligned with UDL checkpoints.

In sum, a research agenda grounded in **design-based implementation**, rigorous evaluation, and intersectional analysis will be critical to advancing both the theory and practice of Universal Design for Learning as a lever for gender-transformative VET reform.

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