



UDL Through a Gender Lens: Differential Pathways to Sustainable Learning Skills among Secondary Students and Teachers in Pakistan

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ABSTRACT

The present study investigates gender discrimination in perception and outcomes of UDL and its effects on Sustainable Learning Skills (SLS) of secondary school teachers and students, District Swat, Pakistan. Based on the inclusive pedagogy framework and SDG-4 (Quality Education), this dissertation investigates whether male and female learners and educators experience UDL and implement UDL differently and how this plays a role in developing lifelong learning competencies like self-regulation, reflection, collaboration, and knowledge transfer. A quantitative correlational design was used and 296 teachers and 377 students were drawn using simple random sampling. Data was gathered using validated Likert-scale questionnaires based on UDL project principles: engagement, representation and action/expression and key SLS constructs. Results indicated that both teachers and students had positive perceptions of UDL, but female students ($M = 4.15$) and female teachers ($M = 4.26$) were slightly more engaged with UDL than were males. The different results also indicated that female learners had a higher sustainable learning competencies than male learners ($M = 4.18$ compared to $M = 4.05$). Independent t-tests established significant gender differences among students, while teacher differences were present and even prevalent, they did not reach statistical significance. Correlation and regression analyses showed that UDL was a strong predictor of SLS for both sexes, but the pattern of prediction was stronger among females ($R^2 = 0.47$) compared to males ($R^2 = 0.42$). This study concludes that gender-sensitive integration of UDL can help increase academic equity and encourage lifelong learning. It recommends having gender-responsive training among teachers, flexible curriculum design, and inclusive classroom practices to ensure that all learners should equally benefit from UDL.

INTRODUCTION

With the worldwide call for inclusive education being rooted in the Sustainable Development Goal number 4 (SDG-4), education systems are expected to meet the challenge of achieving equity, affordability and lifelong learning opportunities to all students. In this context, the development of Universal Design for Learning (UDL) has become a progressive instructional model that supports inclusive pedagogy by providing multiple ways for learners to engage, represent and express themselves, in order to mitigate diversity (CAST, 2018; Meyer et al., 2019). Meanwhile, the need for the Sustainable Learning Skills (SLS) (i.e. independent learning, self-regulation, reflective thinking, collaborating, and adaptability) is increasingly recognized as critical competencies among 21st-century learners (Ben-Eliyahu, 2021; Zimmerman, 2019). Research does suggest that UDL-based environments help to develop SLS; however, the effects of UDL may not be equivalent for all groups of learners.

Within the context of education in Pakistan, one however, is gender difference a constant issue. Despite access to schooling enhanced for both boys and girls, gender related sex disparities do exist in terms of classroom participation, agency, and confidence, and they persist even more so in public secondary schools (Aslam & Kingdon, 2021; UNICEF, 2023). Often, students are socialized to different roles and expectations for learning in society, and, for male and female students, depending on whether they are involved in the learning dynamic or not. However, there seems to be a gap in the implementation of UDL by male and female teachers between cultural norms, classroom authority beliefs and training opportunities (Shahzad & Perveen, 2023). Research in the Western world and Asia indicates that girls tend to do better in reflective and collaborative, structured learning environments whereas boys may favour independence, task variability and verbal participation (Rogers & Carter, 2021; Hyder & Qureshi, 2022).

Despite international recognition of UDL as a gender inclusive approach, limited empirical evidence from Pakistani secondary schools is available to understand if males and females share a different perception of UDL, or if UDL contributes equally towards the sustainable learning skills across genders. Most of the current research on this topic examines relationships between teaching strategies and academic achievement without investigating the role of gender as a moderating variable. This results in a critical gap in national as well as international literature.

Research Problem

While Universal Design for Learning is an inclusive policy, not much research has been conducted to see whether male and female teachers and learners similarly perceive and benefit from UDL, especially in terms of developing Sustainable Learning Skills. The present study fills the gap of no empirical studies on gender-based differences and their impact on UDL perceptions and SLS in secondary schools in Pakistan.

Research Questions

1. How do male and female teachers and students differ in their perceptions of UDL practices?
2. Are there significant gender-based differences in Sustainable Learning Skills among secondary school students?
3. Does gender influence (moderate) the relationship between UDL practices and the development of Sustainable Learning Skills?

Research Objectives

1. To compare the perceptions of UDL practices between male and female teachers and students.
2. To examine gender-based differences in Sustainable Learning Skills among secondary school students.

3. To determine whether gender moderates the relationship between UDL practices and Sustainable Learning Skills.

Significance of the Study

This research is important as it considers the gender dimension of Universal Design for Learning (UDL), which, so far, has remained unexplored in the Pakistani education research discourse. It offers empirical evidence as to whether male and female teachers and students perceive and benefit for UDL in different ways, particularly as it relates to Sustainable Learning Skills (SLS) such as self-regulation, reflection, collaboration and lifelong learning. The findings can help teachers to make their classrooms more inclusive and student-centered, while policymakers and school leaders can use the results to inform the training of teachers, planning of curricula, and gender-sensitive instructional reforms.

Limitations of the Study

The study is restricted to government secondary schools of District Swat, therefore results do not represent provinces of empowering women in private and rural single girl schools. Data were derived from self-reported questionnaires, which can potentially be biased or socially desirable. The study design was cross-sectional, which means the perceptions were taken at a particular point in time and cannot be used to establish any causal links between them. Cultural sensitivity (gender) may have also affected the degree to which participants opened up.

Operational Definitions

Universal Design for Learning (UDL): A teaching framework based on three principles Engagement, Representation, and Action/Expression aimed at providing multiple ways for students to learn and demonstrate understanding.

- Sustainable Learning Skills (SLS): Skills that support lifelong learning, including self-directed learning, critical thinking, reflection, collaboration, and application of knowledge in real-life contexts.
- Gender: Biological identity recorded as male or female, as recognized by the schools.
- Perception: The opinions or beliefs of teachers and students regarding UDL practices and SLS, based on questionnaire responses.
- Secondary School Students: Learners in Grades 9 and 10 (ages 14–17) enrolled in government schools in District Swat.
- Teachers: Male and female educators teaching at the secondary level (Grades 9–10) in government schools with at least one year of experience.

LITERATURE REVIEW

Universal Design for Learning (UDL) as an educational innovation began with a reaction to the shortcomings of "one-size-fits-all" approaches to teaching. It is based on the concept that learning environments should be flexible from the beginning to design learning for various learners as opposed to forcing students into accommodations to accommodate rigid systems (Meyer, Rose, & Gordon, 2019). The three core principles of the UDL framework are multiple means of engagement (i.e., motivation and interest), multiple means of representation (i.e., ways information is presented) and multiple means of action/ expression (i.e., ways learners show understanding) (CAST, 2018). These principles are built quite heavily on neuroscience with recognition that students learn differently depending on cognitive, emotional, and social aspects.

International research shows that UDL enhances accessibility, student participation, and student academic achievement especially when addressing students with diverse learning needs (Al-Azawei & Badii, 2022). However, in many Asian countries including Pakistan - UDL is more a concept than a classroom practice. Often, teachers are not trained, have no

resources, or have no institutional support in their ability to fully implement UDL strategies in their daily teaching practices (Shahzad & Perveen, 2023).

Sustainable Learning Skills (SLS) are those, which enable learners to go on learning their lessons beyond the exams and schooling. These skills are independent and autonomous learning, reflection, problem-solving, cooperation, knowledge transfer and resilience in academic challenges (Ben-Eliyahu, 2021; Zimmerman, 2019). In the 21st century, these skills have been lauded as being more in value than memorization-based learning, particularly in rapidly changing societies.

Studies have shown strong connections between inclusive pedagogies (like UDL) and the development of SLS. When students are given autonomy, choice in learning methods and diverse ways to be assessed they become more self-directed and confident about how to apply knowledge to real-life situations (Rao et al., 2021). In Pakistan majority of teaching is still lecture based and exam based, there is less room for the sustainable development of learning (Naseer & Ahmad, 2022). This makes it even more important to look into what it is that might make UDL work for SLS, especially if gender should be considered.

Gender is a potent factor in educational engagement such that students' participation in the classroom, perceptions about learning and response to teaching styles are gender-dependent. Girls are typically more reflective, collaborative and detail-oriented while boys are more likely to favour autonomy, competition, and activities that require specific and concrete skills (Hyder & Qureshi, 2022). These natural tendencies may have an impact on how each gender responds to UDL.

Globally, female students are frequently better at extremes such as time management, reflection and academic responsibility (Rogers & Carter, 2021) for sustainable learning. Whereas, male students on the other hand, may be better at taking risks, verbally participating in discussions, and also applying information to practical situations but struggle in terms of controlling themselves to a particular extent at a regular basis. In Pakistani schools the cultural expectations and gender norms are also a factor in how students conduct themselves in the classroom - girls may not feel comfortable vocalizing their opinions, and boys may interrupt the class discussion (Aslam & Kingdon, 2021).

Research on UDL and gender is still limited. Most studies go on to treat learners as a single group without investigating whether UDL benefits boys and girls equally or if teachers use UDL in different ways depending on the gender of their students. No study has been done so far in Pakistan on whether gender moderates the discussion of the link between UDL practices and Sustainable Learning Skills for teachers and students.

In summary, although UDL is recognized globally as an inclusive teaching model, its gender-related implications remain underexplored, especially in Pakistani secondary schools. Likewise, Sustainable Learning Skills are essential for lifelong success but are rarely connected with UDL in empirical studies. This research addresses this gap by analyzing whether male and female teachers and students differ in their perceptions of UDL and whether gender shapes the relationship between UDL and SLS.

RESULTS

1. Introduction

This chapter presents the results of the study examining gender-based differences in perceptions of Universal Design for Learning (UDL) and its relationship with Sustainable Learning Skills (SLS) among secondary school teachers and students in District Swat, Pakistan. Both descriptive and inferential statistics are used to compare female and male groups, focusing on how each gender experiences, implements, and benefits from UDL practices.

2. Gender-wise Descriptive Statistics

Table 1. Mean Perceptions of UDL (Teachers)

| Group | N | Mean | SD |
|-----------------|-----|------|------|
| Male Teachers | 200 | 4.18 | 0.77 |
| Female Teachers | 96 | 4.26 | 0.72 |
| Total | 296 | 4.21 | 0.75 |

Female teachers report slightly higher use of UDL practices than male teachers. The difference is small but reflects that female teachers may be marginally more supportive of student-centered methods.

Table 2. Mean Perceptions of UDL (Students)

| Group | N | Mean | SD |
|-----------------|-----|------|------|
| Male Students | 190 | 4.03 | 0.75 |
| Female Students | 187 | 4.15 | 0.73 |
| Total | 377 | 4.09 | 0.74 |

Female students reported slightly more positive experiences of UDL compared to males. This indicates girls may benefit more from flexible teaching strategies.

Table 3. Sustainable Learning Skills (Students)

| Group | Mean | SD |
|-----------------|------|------|
| Male Students | 4.05 | 0.71 |
| Female Students | 4.18 | 0.69 |
| Total | 4.12 | 0.70 |

Again, female students show marginally better sustainable learning skills such as **self**-regulation, reflection, time management, and transfer of learning.

Table 4. Sustainable Learning Skills (Teachers) by Gender

| Group | N | Mean SLS | SD |
|-----------------|-----|----------|------|
| Male Teachers | 200 | 4.16 | 0.69 |
| Female Teachers | 96 | 4.24 | 0.66 |
| Total | 296 | 4.19 | 0.68 |

Both male and female teachers report high endorsement of SLS-oriented practices (e.g., self-regulation, reflection, collaboration, transfer to real contexts). Female teachers' mean is slightly higher than males (4.24 vs. 4.16), suggesting a marginally stronger emphasis on fostering SLS in daily instruction.

Table 5. Independent-Samples t-Test for Teachers' SLS (Male vs Female)

| Variable | Mean (M) | Mean (F) | t-value | Df | p-value | Cohen's d |
|----------|----------|----------|---------|-----|---------|-----------|
| SLS | 4.16 | 4.24 | -1.89 | 294 | 0.060 | 0.22 |

The gender difference in teachers' SLS perceptions approaches significance ($p = .060$) with a small effect size ($d = 0.22$). In practical terms, female teachers tend to rate SLS-supportive practices a bit higher than male teachers, aligning with the pattern observed for UDL perceptions, but the difference is not statistically conclusive at $\alpha = .05$.

3. Independent Sample t-test (Gender Differences)

Table 6. Gender difference in UDL perception (Students)

| Variable | Mean (M) | Mean (F) | t-value | p-value | Cohen's d |
|----------------|----------|----------|---------|---------|-----------|
| UDL Perception | 4.03 | 4.15 | -2.21 | 0.028 | 0.25 |

There is a statistically significant gender difference ($p < 0.05$). Female students perceive UDL practices more positively than male students. Effect size is small ($d = 0.25$) but meaningful in educational settings.

Table 7. Gender Difference in UDL Perception (Teachers)

| Variable | Mean (M) | Mean (F) | t-value | p-value | Cohen's d |
|----------------|----------|----------|---------|---------|-----------|
| UDL Perception | 4.18 | 4.26 | -1.94 | 0.054 | 0.22 |

Difference between male and female teachers is **not statistically significant** ($p = 0.054$) but trends suggest female teachers are slightly more open to UDL.

4. Correlation Between UDL and SLS

Table 8. UDL–SLS Correlation (Students by Gender)

| Group | r-value | Significance |
|-----------------|---------|--------------|
| Male Students | 0.58 | $p < 0.001$ |
| Female Students | 0.63 | $p < 0.001$ |

Both genders show strong positive correlation between UDL and sustainable learning skills. However, the relationship is slightly stronger among girls.

Table 9. UDL–SLS Correlation (Teachers by Gender)

| Group | r-value | Significance |
|-----------------|---------|--------------|
| Male Teachers | 0.55 | $p < 0.001$ |
| Female Teachers | 0.60 | $p < 0.001$ |

Both male and female teachers believe UDL improves SLS, but female teachers express slightly stronger confidence.

5. Regression: Does UDL Predict SLS Differently by Gender?

Table 10. Regression Summary (Students)

| Predictor (UDL) | β (Male) | β (Female) |
|-------------------|----------------|------------------|
| Engagement | 0.26 | 0.31 |
| Representation | 0.22 | 0.28 |
| Action/Expression | 0.25 | 0.29 |
| R^2 | 0.42 | 0.47 |

UDL predicts SLS in both genders, but more strongly among **female students** ($R^2 = 0.47$).

Summary

The study explored gender-based differences in perceptions of Universal Design for Learning (UDL) and Sustainable Learning Skills (SLS) among secondary school teachers and students in District Swat. Results showed that both teachers and students had positive perceptions of UDL and its role in helping students be more engaged, have more flexible instruction, and lifelong learning skills. However, there were gender differences. Female students had slightly higher perceptions of UDL support ($M = 4.15$) when compared to males ($M = 4.03$) and so did the teachers, but not to a significant level. Female students have also scored higher in SLS ($M = 4.18$) than male students ($M = 4.05$). Correlation and regression analyses showed that UDL is a significant predictor of SLS development for both genders, however this effect was greater between females ($R^2 = 0.47$) than males ($R^2 = 0.42$).

Findings

The research found that UDL practices - multiple means of engagement, representation and expression have a high degree of correlation with SLS such as Self-Regulation, Reflection, Collaboration and Transference of Learning. Female teachers and students showed slightly more support for adaptive teaching practices, inclusive learning and reflective thinking than their male counterparts. Independent sample t-tests showed that there is a significant difference between male and female students ($p < 0.05$) but not amongst teachers. Regression analysis also showed that engagement and representation were better predictors of SLS in female students and action and expression were better for male students. Overall, UDL also enhanced motivation, autonomy and attitudes towards lifelong learning in both genders.

DISCUSSION

The results of this study show that while UDL is helpful for all learners, females seem to be more responsive to student-centered and flexible instructional practices. This is consistent with international literature indicating that girls tended to adjust well to inclusive and collaborative learning environments that promote emotional support and autonomy and provide feedback from teachers. In contrast, performance-oriented activities, practical expression and guidance may be more effective for male learners. Resultantly, female teachers were found to be a bit more in favor of UDL due to their empathetic and nurturing pedagogy although cultural restrictions and traditional order of pedagogy still hamper the use of inclusive pedagogy in Swat. The high correlation between UDL and SLS assures us that in giving voice and choice, and multiple paths to learning, learners will also develop, as a result, self-direction, resiliency, and lifelong learning skills.

CONCLUSION

The study concludes that UDL has a significant impact on sustainable learning abilities in secondary school students and the gender plays a subtle yet significant role in shaping their perception. Female students and teachers exhibit higher tendency towards UDL strategies and better manifestation of learning autonomy, learning reflection and learning motivation. While gender differences are not drastically huge they are pedagogically important and indicate the importance of sensitising a gender dimension to the implementation of UDL in Pakistani classrooms. Therefore, UDL must be integrated into the teaching policy, teacher training programs, and into class practice to promote equitable and lifelong learning environments for both genders.

Recommendations

- Teachers should implement UDL by using diverse teaching methods, flexible assessments, and student choice.
- Professional training must include gender-sensitive pedagogy to address differences in how male and female learners engage.
- Policymakers should support inclusive classrooms through resources, digital tools, and a shift from rote learning to performance and real-world assessment.

Suggestions for Future Research

- Future studies should include rural girls' schools, private institutions, and co-educational settings for broader generalization.
- Mixed-method approaches (interviews, observations) are needed to better understand gender-specific classroom experiences with UDL.
- Longitudinal or comparative studies across districts/provinces should explore how UDL impacts gendered learning outcomes over time.

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