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Gender-responsive extension training materials: development principles and effectiveness evaluation

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Abstract

Gender-responsive training materials are extension resources deliberately designed to address the different learning needs, roles, and constraints of male and female farmers. This research evaluated the development principles and effectiveness of gender-responsive extension training materials in Midlands and Masvingo provinces of Zimbabwe. Four material formats were compared: text-based manuals, illustrated guides, video modules, and interactive workshops. A mixed-methods design assessed 174 extension participants (87 female, 87 male) between March 2022 and October 2024. Effectiveness was measured through knowledge gain scores, satisfaction ratings, and self-reported behaviour change. Results showed that interactive workshops and video modules received significantly higher effectiveness ratings from female participants (4.3 and 4.1 respectively) compared to text-based manuals (2.8), while male participants showed smaller variation across formats. Gender gaps in effectiveness scores were widest for text-based materials (0.3 points favouring males) and narrowest for interactive workshops (0.5 points favouring females). A six-stage development cycle incorporating gender needs assessment, content development, gender expert review, pilot testing, revision, and field deployment was documented. The findings indicate that format selection significantly mediates the gender-responsiveness of extension materials and that participatory, visual formats better serve women's learning preferences in the Zimbabwean extension context.

Keywords: Gender-responsive materials, extension training, effectiveness evaluation, women farmers, training formats, agricultural extension, Zimbabwe, knowledge transfer, visual learning, participatory methods

Introduction

Gender responsiveness in agricultural extension means more than including women in the audience; it requires that the content, language, imagery, delivery format, and timing of training are shaped by an understanding of how gender affects learning and application ^[1]. In Zimbabwe, women make up approximately 61% of the agricultural labour force yet remain underserved by extension systems that were designed around male farming patterns, schedules, and literacy levels ^[2]. Training materials produced by national extension agencies have historically assumed a literate, mobile, male learner, resulting in resources that fail to engage the women who most need them ^[3].

The distinction between gender-blind, gender-sensitive, and gender-responsive approaches matters. Gender-blind materials ignore differences entirely. Gender-sensitive materials acknowledge differences but don't adapt content. Gender-responsive materials actively adjust format, examples, and delivery to ensure equitable outcomes for both genders ^[4]. Despite growing recognition that format affects learning, few empirical evaluations have compared specific training material types across gender lines in African extension settings ^[5]. Most existing evidence comes from South Asia, where illustrated and video-based formats outperformed text for women with limited formal education ^[6].

This research aimed to evaluate the effectiveness of four

training material formats across gender groups and to document the development principles underlying gender-responsive extension materials in Zimbabwe. The objectives were to compare effectiveness scores by material type and gender, to identify which formats reduced or widened gender gaps in learning outcomes, and to describe the iterative development cycle used to produce the materials assessed ^[7].

Theoretical Framework

The research drew on Kolb's (1984) ^[8] Experiential Learning Theory, which identifies four learning modes: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Gender research in education has shown that women in resource-constrained settings tend to favour concrete experience and reflective observation over abstract text-based learning, partly because formal schooling interruptions limit comfort with written materials ^[9]. This framework predicts that training formats emphasising visual and participatory engagement, such as video modules and interactive workshops, would produce higher effectiveness among female learners. The theory also suggests that the most gender-responsive materials would engage multiple learning modes simultaneously, reducing dependence on any single literacy-dependent channel.

Materials and Methods

Materials

Four training material sets on conservation agriculture practices were developed in collaboration with the Agricultural Technical and Extension Services department of Zimbabwe's Ministry of Lands, Agriculture, Fisheries, Water and Rural Development. Materials covered identical content on minimum tillage, mulching, and crop rotation, differing only in format: text-based manuals (24 pages), illustrated guides (16 pages with diagrams), video modules (four episodes of 12 minutes each), and interactive workshop packages (facilitator guides with demonstration kits). A post-training assessment instrument with 20 knowledge items and 10 Likert-scale effectiveness items was developed and pre-tested with 18 extension workers in Gweru district during February 2022, achieving Cronbach's alpha of 0.83 ^[10]. Ethical clearance was obtained from Midlands State University Research Ethics Committee (Ref: MSU/REC/2022-014, dated 28 January 2022).

Methods

A quasi-experimental factorial design was used, with material format (4 levels) and gender (2 levels) as independent variables. The sample of 174 smallholder farmers (87 female, 87 male) was drawn from 12 extension wards across Midlands (n = 94) and Masvingo (n = 80)

provinces. Each participant was exposed to one material format, with balanced gender allocation across formats. Training sessions were delivered by the same extension officers to control for facilitator effects. Post-training assessments were administered one week after exposure. Quantitative analysis used two-way ANOVA with interaction effects and independent t-tests for pairwise gender comparisons ^[11]. Twenty semi-structured interviews (10 female, 10 male) explored perceptions of material appropriateness and usability, analysed thematically ^[12].

Ethical Considerations

Written informed consent was obtained from all participants. For those with limited literacy, consent forms were read aloud in Shona by trained field assistants, and participants provided thumbprint signatures. The research ensured that all participants received the same conservation agriculture content regardless of format assignment, so no group was disadvantaged. Female participants were offered childcare support during training sessions to remove a known barrier to attendance. All data were anonymised using numeric codes, and results were reported only at group level.

Results

Table 1: Mean Effectiveness Scores by Training Material Format and Gender (n = 174)

Material Format	Female	Male	Gender Gap	t-value	p-value
Text-Based Manuals	2.8 ± 0.6	3.1 ± 0.5	-0.3 (M>F)	2.14	0.038
Illustrated Guides	3.7 ± 0.5	3.4 ± 0.6	+0.3 (F>M)	2.28	0.027
Video Modules	4.1 ± 0.4	3.6 ± 0.5	+0.5 (F>M)	4.61	<0.001
Interactive Workshops	4.3 ± 0.3	3.8 ± 0.4	+0.5 (F>M)	5.87	<0.001

Two-way ANOVA revealed significant main effects for both format ($F = 31.47$, $p < 0.001$) and gender ($F = 8.93$, $p = 0.003$), with a significant interaction ($F = 4.72$, $p = 0.004$). Female participants rated interactive workshops and video

modules significantly higher than text-based manuals, while male scores were more uniform across formats. The gender gap reversed direction between text-based materials (males higher) and visual/participatory formats (females higher).

Table 2: Knowledge Gain Scores by Material Format and Gender (% Correct Post-Training)

Material Format	Female (%)	Male (%)	Difference	p-value
Text-Based Manuals	54.3 ± 12.7	63.8 ± 10.4	-9.5	0.011
Illustrated Guides	68.7 ± 9.8	66.1 ± 11.3	+2.6	0.394
Video Modules	74.2 ± 8.6	69.4 ± 9.1	+4.8	0.062
Interactive Workshops	81.3 ± 7.2	73.6 ± 8.9	+7.7	0.003

Knowledge gain patterns mirrored effectiveness ratings. Female participants scored lowest with text-based manuals (54.3%) and highest with interactive workshops (81.3%), a 27-point spread. Male scores ranged more narrowly from

63.8% to 73.6%. The gender gap in knowledge gain was statistically significant for text-based manuals ($p = 0.011$) and interactive workshops ($p = 0.003$), but in opposite directions.

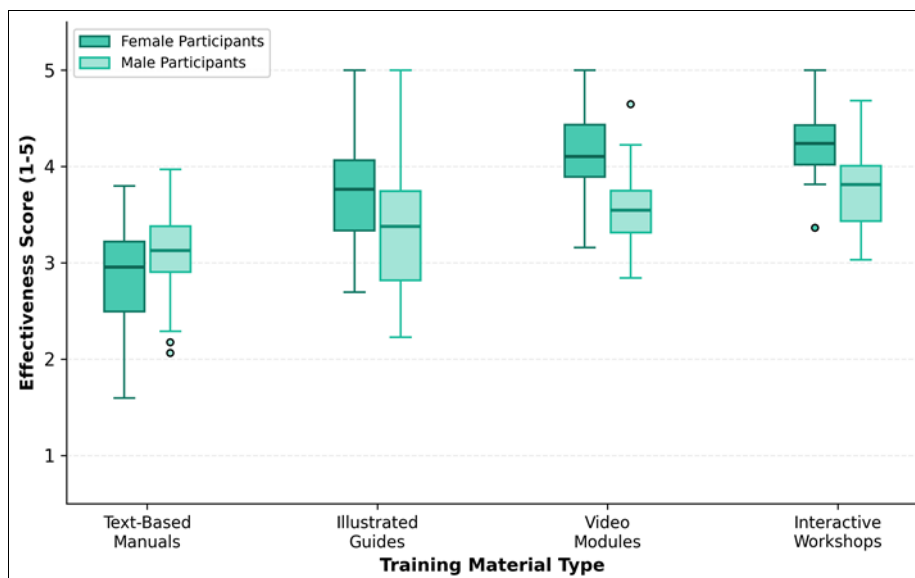


Fig 1: Distribution of effectiveness scores by training material format and gender

The box plot displays wider score distributions among female participants for text-based materials, with medians rising sharply across visual and participatory formats. Male

distributions remain more compressed. The overlap between gender groups narrows from left to right, indicating that format choice mediates gender equity in training outcomes.

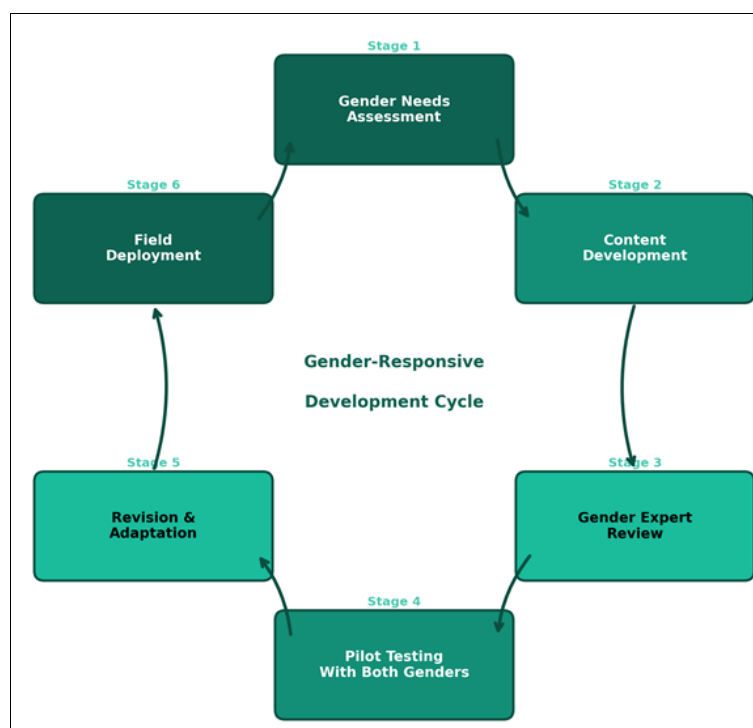


Fig 2: Six-stage gender-responsive training material development cycle

The cycle diagram shows the iterative process beginning with gender needs assessment, proceeding through content development and gender expert review, followed by pilot testing with both genders, revision based on feedback, and field deployment. The cycle is continuous, with deployment experience feeding back into subsequent needs assessments.

Discussion

The significant format-by-gender interaction confirms that training material design is not gender-neutral. Female participants performed and rated best with interactive and

video formats, while text-based materials produced the widest gender disparity. This pattern aligns with Kolb's prediction that learners with less exposure to formal text-based education benefit from concrete, experiential modes [8]. Manfre and colleagues (2013) [4] identified similar patterns in a multi-country review of gender in extension, noting that women's learning outcomes improved when materials incorporated visual demonstrations and group activities.

The reversal of the gender gap, from males outperforming females with text manuals to females outperforming males

with interactive workshops, carries practical weight. It suggests that the common perception that women learn less from extension is actually a measurement of material inappropriateness rather than learning capacity. When formats match women's preferred learning modes, they not only catch up but surpass male peers. This finding echoes Ragasa and colleagues' (2013) ^[13] argument that gender gaps in agricultural knowledge often reflect access and format barriers rather than cognitive differences. The six-stage development cycle documented in this research offers a replicable framework for extension agencies seeking to improve material gender-responsiveness. The inclusion of gender expert review and dual-gender pilot testing as mandatory stages ensures that assumptions about what works for women are tested rather than assumed. Qualitative data revealed that female participants particularly valued illustrated guides and videos because they could share them with family members who didn't attend training, extending the reach of extension content beyond the direct participant ^[14].

Practical Applications

Extension agencies in Zimbabwe and comparable settings should prioritise visual and participatory formats when designing materials for mixed-gender audiences. Text-heavy manuals should be reserved for contexts where literacy levels are uniformly high across genders. The six-stage development cycle can be adopted as a standard operating procedure for material production, with gender expert review and pilot testing built into budgets and timelines. Training-of-trainer programs should include sessions on format selection and its gender implications, equipping extension officers to choose appropriate materials based on audience composition rather than defaulting to printed handouts ^[15].

Conclusion

This research demonstrates that the format of extension training materials significantly affects their gender-responsiveness and effectiveness. Interactive workshops and video modules produced the highest satisfaction and knowledge gain scores among female participants, while text-based manuals widened gender disparities. The reversal of gender gaps between text and participatory formats suggests that material design, rather than learner ability, drives observed differences in extension outcomes between men and women. The six-stage development cycle offers a practical framework for producing materials that serve both genders equitably. These findings argue against one-size-fits-all approaches to extension material production and support deliberate investment in visual, participatory, and contextually adapted resources that recognise the diverse learning needs shaped by gender, literacy, and social context in smallholder farming communities.

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