



**Module Training Document: Improved Rice Irrigation Farming and Use of Mosquito
Nets in Wami Basin Water Users Association (WUA), Morogoro - Tanzania**

FEBRUARY, 2025

Table of Contents

SECTION I: ANALYSIS DOCUMENT	1
1.1 Overview	1
1.2 Description of the Project	1
1.2 Needs Analysis	2
1.3 Learners Analysis	2
1.4 Performance Gap Analysis	2
1.5 Contextual Analysis	3
1.6 Unit Goals and Objective	3
1.6.1 Overall goal	3
1.6.2 Specific objectives	3
1.7 Topic Analysis	3
1.8 Procedural Analysis	4
1.9 Task Analysis	4
SECTION II: DESIGN DOCUMENT	5
2.1 Instructional Sequencing	5
2.2 Instructional Message: Pre instructional strategies	5
2.3 Strategies Table	6
2.4 Text Design	6
2.5 Multimedia Design	7
SECTION III: DVELEOPMENT GUIDE.....	8
3.1 Instructional Materials	8
3.2 Online Platform and Delivery Methodology	8
3.3 Description of Assessment Materials	8
3.3.1 Multiple-Choice Assessment	8
3.3.2 Performance Rubric Assessment	9
SECTION IV: IMPLEMENTATION PLAN AND FACILITATOR GUIDE	11
4.1 Background and Goals	11
4.2 Introduction to the Unit	11
4.2.1 Learning objectives	11

4.2.2	Structure of this guide.....	11
4.3	Pre-Workshop Planning	11
4.3.1	Preparing participants.....	11
4.3.2	Student groupings	12
4.3.2	Giving participants advance information.....	12
4.4	Instructional Environment, Equipment, and Materials	12
4.4.1	Considerations for the delivery environment.....	12
4.4.2	Equipment and materials	12
4.4.3	Handouts and media support	12
4.5	Instructional Delivery and Sequencing.....	12
4.5.1	Overview of lesson.....	12
4.5.2	Sequence of activities.....	13
4.5.3	Step-by-step process.....	13
4.6	Assessment of Learning.....	13
4.6.1	Pre-assessment strategies	13
4.6.2	Formative assessment strategies	13
4.6.3	Summative assessment strategies.....	13
5.1	Overview	14
5.2	Steps for Evaluation.....	14
5.2.1	Pre-implementation phase	14
5.2.2	During implementation phase.....	14
5.2.3	Post-implementation phase	14
5.3	Evaluation Tools Development	15
5.3.1	Baseline & post-assessment surveys	15
5.3.2	Participant engagement checklists	15
5.3.3	Quiz and feedback forms	15
5.4	Linking Goals to Evaluation Components	15
REFERENCES.....		16

SECTION I: ANALYSIS DOCUMENT

1.1 Overview

Agricultural productivity is central to food security, with rice being a staple crop for millions worldwide. However, farmers often face challenges related to inefficient irrigation practices, pests, and inadequate protection from vector-borne diseases. This training module aims to equip farmers with improved irrigation techniques and the effective use of mosquito nets to enhance their yield and reduce health risks associated with mosquitoes.

1.2 Description of the Project

The Wami Basin has over 1000 rice farmers under the umbrella of the Wami Users Association (WUA). For many years, these farmers have been producing rice using irrigation along the Wami River Basin. Despite having water resources and arable land for farming, their production levels have been extremely low. This was due to poor farming practices and a lack of improved farming methods. The malaria epidemic has frequently impacted farmers. This is because many of them lack knowledge on how to combat malaria or have negative perceptions about the use of mosquito nets. Prior to this analysis, the government provided nets to all households in this area. But many of them have not been using the nets, as they perceive that using mosquito nets causes impotence among men. Similarly, the study by Perera et al., (2022) revealed that impotency-related perceptions lead to poor compliance with the use of certain malaria drugs. Agricultural productivity was weakened due to the prevalence of illnesses caused by the malaria epidemic among farmers. Interviews with farmers also revealed that a lack of funds often prevents them from treating themselves when they contract malaria. They have funds only after harvesting. They remain broke for the remainder of the season, which means they lack the funds to purchase malaria treatment commodities, including health insurance.

WUA members have been facing low prices for their rice, a consequence of selling their crops to middlemen known as, 'market masters'. Market masters' presence allowed for the exploitation of farmers' produce, as they purchased the farmers' rice at a low price and then sold it at a higher price to make a substantial profit. Farmers faced other challenges, such as the absence of an organization database that contained crucial information about pre-planting, planting, harvesting, and post-harvesting practices. Mittal and Tripath (2009) argue that the availability of information on inputs, outputs, and non-price factors, such as the quality of seeds and technology required for farming, can help increase productivity. Such information can assist the union in negotiating different prices for large-scale supplies and securing major buyers for harvests, thereby eliminating the middlemen (Mittal and Tripath, 2009). An information database can guarantee that the organization receives regular updates for bulk procurement of farm implements, fertilizers, and herbicides. Not only does the information ensure bulky procurement, but it can also facilitate the process of marketing by securing major buyers of the crops. Farmers have also expressed their

dissatisfaction with the union's poor governance, citing irregular meetings and inadequate formation of WUA committees.

1.2 Needs Analysis

WUA rice farmers are the target audience for this training. It is important to understand their context in order to design the training. Interactive ADDIE Media (n.d.) cites Herring, who argues that the instructional designer (ID) must comprehend the entire course context. This forms the foundation of the ID, which encompasses an understanding of the learners, the course content, and the intended goals, along with the strategies to achieve them. An instructional designer must comprehend the learners and the intended outcomes. Conducting a knowledge base test allows for the analysis of learners. This helps to understand the context of the learners, their needs, and adapt the course. The Wami Users Association (WUA) is their registered cooperative union. To obtain information about these farmers, interviews were conducted in the project area. This is justified by Tamayo et al., (2023), who used a questionnaire, interviews, and FGD to gather data for need analysis. Similarly, through the use of interviews with farmers, this project discovered that farmers face a variety of challenges, such as the malaria epidemic, limited market access, low crop prices, subpar farming practices, and inadequate organizational governance. These challenges have resulted in poor organizational performance and poverty among WUA members.

1.3 Learners Analysis

The lack of improved farming methods among WUA farmers has resulted in low productivity. Farmers also have negative perceptions about using mosquito nets. Mbijiwe (2019) discovered that the key to effective malaria control methods lies in education. Additionally, strengthening organizational leadership, establishing good governance, and establishing various committees within the organization, such as a marketing committee and a procurement committee, are crucial steps towards reducing reliance on market masters. Generally, these farmers require training to enhance their farming techniques, as well as behavior modification training to enhance their understanding of mosquito net usage. The leadership of WUA requires instruction in good governance. Munishi (2021) recognizes this type of training as a tool for empowering leadership and enhancing organizational effectiveness.

1.4 Performance Gap Analysis

Using this instructional design, it is anticipated that there will be a decline in the prevalence of malaria among WUA rice farmers. In turn, this will ensure good health, productivity, and resilience (Obrist et al., 2010). Farmers will also acquire improved farming methods, which will increase the yields and income. From the income, farmers will save some funds, in which some of it will be used to buy malaria treatment commodities, including drugs and

insurance packages. The study by Pandey et al., (2024) has demonstrated that training farmers offers numerous benefits, such as enhancing soil health, boosting crop productivity, and promoting sustainable farming practices. The training will lead to an overall improvement in organizational leadership, enabling the leadership to adhere to the principles of good governance.

1.5 Contextual Analysis

Morrison et al., (2019) argue that it is important to consider the learners of whom a program is developed. In this context, it is crucial to understand the levels of learners and the characteristics of the population, as these factors can either support or hinder the design. In the context of WUA, many of the learners are irrigation farmers. Their knowledge of crop production is inadequate. They have been relying on government extension officers to get technical support in farming. However, the government lacks enough extension officers to provide full support across the country. Mkuki et al., (2020) have shown that over 85% of farmers acknowledge that lack of extension officers is the main problem facing the farmers in Tanzania. Morrison et al., (2019) added that instructional designers must obtain information about the capabilities, needs, and interests of the learners. This will affect the entry point, selection of the topic, the choice and sequence of the objectives, the depth of the topic treatment, and the variety of learning activities.

1.6 Unit Goals and Objective

1.6.1 Overall goal

The goal of this projects training is to enhance the productivity of rice farming while ensuring farmer health and safety through improved irrigation practices and the effective use of mosquito nets.

1.6.2 Specific objectives

At the end of the session(s), learners [WUA farmers TOTs and leadership] should be able to:

- i. Apply improved rice farming methods to increase productivity and enhance their livelihoods
- ii. Appropriately use mosquito nets to prevent themselves from malaria

1.7 Topic Analysis

Key topics include:

- Seeding and spacing topic
- Best practices for using mosquito nets
- Principles of efficient rice irrigation

1.8 Procedural Analysis

What learner does	Steps	Cues
Select seed variety. Sorting of seed to determine the rice seeds quality	Measuring and sorting the rice grains by sizes	Existence of lighter grains Remove the lighter grains to remain with the best seeds
Calculate the sowing space between one seed and another (in centimeter) in a rice farm	Calculating the line spacing for rice seeds sowing	Irregular lines of seed sowing holes. Correct the lines to have a correct line spacing
Identify size and color of mosquito nets, Step by step setting of mosquito net	Knowing various sizes and color of mosquito nets and step by step of setting mosquito net	Undersize/ Oversize mosquito net vs bed. Use appropriate mosquito net size with bed to have effectively prevent mosquitos penetration inside the net
Determine the volume of water for irrigating the rice	Knowing the principles of rice irrigation	Over irrigation or under irrigation Opening or closing water gates to control the volume of water

1.9 Task Analysis

- Procedure for seeding space in a rice farm
- Procedure for setting a mosquito net
- Principles of irrigation

SECTION II: DESIGN DOCUMENT

2.1 Instructional Sequencing

Sequence	Description	Objective
1	Opening or closing the irrigation scheme water gate	1
2	Selecting the variety of seeds	1
2	Sorting the quality seeds for sowing	1
3	Calculating the sowing space	3
4	Identifying the size and color of mosquito nets	2
5	Setting a mosquito net	2

2.2 Instructional Message: Pre instructional strategies

Clear, concise information should be presented to ensure that farmers understand the techniques. Real-life examples and relatable scenarios must be included to enhance retention.

Strategy	Function	Content structure	Learner	Task attributes
Pretests	Screening the learners knowledge base on the rice irrigation farming methods and use of mosquito nets	Short questions	Average learners, older and mature	Learners should have familiarity with rice irrigation farming, and malaria disease control
Behavioral objectives	At the end of the lesson, students should be able to: i. Apply improved rice framing methods to improve productivity. ii. Use mosquito nets to prevent them from	Instructional lecture casts on farming practices, malaria control and leadership skills	Average learners, adult	Experienced farmers but lacking: Improved farming methods; appropriate Malaria prevention techniques

	malaria.			
Overviews	Outlines of the training	Module lists	Average learners	Presenting various facts about farming, and malaria prevention
Advanced organizer	Provide various conceptual frame works about improved farming methods and productivity, use of nets and malaria prevention	Video and graphic presentations	Above average and mature learner	Presenting factual information to farmers

2.3 Strategies Table

Procedure	Strategy	Time	Initial presentation and Generative strategy
Seeding and spacing	Demonstration, Organization, Elaboration and Practice	20min	<p>Student attend a Zoom instructional presentation and take notes</p> <p>After watching the video they develop a mental image of selecting, sorting and sowing the seeds in spaced lines.</p> <p>Then they are encouraged to practice the procedure in a rice field</p>
Setting of mosquito net	Demonstration, Organization, Elaboration and Practice	20min	<p>Students attend a Zoom instructional presentation on the use of mosquito net. They take note while watching it. They create a mental image of the process of identifying the size and color of mosquito net. Then they are encouraged to practice it by setting a net in a bed.</p>

2.4 Text Design

Various digital materials will be presented using Zoom and Padlet presentations in relation to farming practices, malaria control and prevention, as well as in good organizational

leadership. In the learning about improved rice farming methods the learner will begin to learn about demonstration of the best practices such as seeding and spacing, while in malaria step by step demonstration will be provided on how to set a mosquito net. Similarly, digital materials will be provided to the students on leadership principles. The signaling the texts' schema will be considered, whereby appropriate texts sizes and colors will be applied in the preparation of digital materials for presentation in order to reduce learners cognitive loading.

2.5 Multimedia Design

Technology	Learning Outcome	Trainer Activities	Learners Activities	Resources	Differentiation
Survey Monkey: https://www.surveymonkey.com/ For assessing the context of participants (knowledge base test or baseline survey)	To acquire the information on the participants knowledge base	Prepare the survey tool Provide link and invite participants to respond	Install the software Fill in the survey form	IT support Survey software	Asynchronous
Zoom: https://www.zoom.com/ For providing virtual training	The participants shall be able to calculate seed sowing space	Prepare Zoom training Provide training link and ask participants to join	Install zoom app Attend zoom training Form Paraprofessional farmers group	IT support Zoom software	Synchronous
Zoom: https://www.zoom.com/ For providing virtual training	The participants shall be able to use mosquito nets	Prepare Zoom training Provide a link and ask participants to join	Install Zoom Join the Zoom training	IT support Zoom software	Synchronous
EdApp: https://www.edapp.com/news/ Evaluating the learning process	Assess how the participants gaining and retaining the knowledge	Create EdApp and ask participants to respond	Install EdApp and answer the questions	IT support EdApp software	Asynchronous

SECTION III: DEVELOPMENT GUIDE

3.1 Instructional Materials

The training program will utilize a variety of instructional materials, including digital presentations, handouts, instructional videos, and interactive demonstrations. Examples of instructional materials might consist of:

- Digital presentations exploring improved irrigation techniques and use of mosquito nets to prevent malaria.
- Instructional videos offering visual demonstrations of effective irrigation techniques and the correct use of mosquito nets.
- Handouts encapsulating essential points, optimal practices, and visually supported instructional guides.

3.2 Online Platform and Delivery Methodology

Training can be delivered online using systems such as Zoom or Microsoft Teams, allowing for remote participation. The materials can also be hosted on e-learning sites such as Moodle, which makes it easier to distribute tests and provide access to other resources (Gamage et al., 2022). Participant engagement and learning can be improved by using interactive techniques like webinars to facilitate conversations and Q&A sessions (Almeida, 2022)..

3.3 Description of Assessment Materials

The assessments is proposed on the context of farmers training on the use of improved rice farming methods under Wami river basin irrigation to enhance livelihoods and the proper use of mosquito nets to prevent malaria incidence. The assessment materials consist of a multiple-choice test paper that includes questions on irrigation methods and malaria prevention, along with a criteria rubric detailing the performance expectations for practical demonstrations. These tools are deliberately used to evaluate both the acquired knowledge and the application of the methods taught during the training sessions. Both assessment methods aim to deliver prompt feedback, assisting farmers in honing their skills and knowledge efficiently

3.3.1 Multiple-Choice Assessment

This tool is aimed to measure the project participants' understanding of fundamental concepts and practices concerning improved rice irrigation methods and malaria prevention through the use of mosquito nets. This tool allows for efficient assessment of various ranges of contents and straightforward analysis.

Sample of instrument items:

Which among the following is NOT a benefit of using improved irrigation rice farming techniques?

- A. Efficient use of labor
- B. Efficient use of water
- C. Increased pest infestation
- D. Increased productivity

What is the main goal of using mosquito nets which are treated with insecticides?

- A. To block malaria-carrying mosquitoes
- B. To improve the living standards
- C. To provide poultry sheds
- D. To reduce room temperatures

Which among the following is most suitable type of irrigation system for water conservation in rice production?

- A. Drip irrigation method
- B. Flood irrigation method
- C. Furrow irrigation method
- D. Surface irrigation method

Rationale for the use of Multiple Choice Test:

The multiple choice test is very effective in the assessments of learners' retention of knowledge and grasping of key concept. Facilitators can easily and quickly provide the scoring and diagnose the areas where learners need further assistance and clarifications. A study by Little & Bjork (2015) shows that multiple choice tests can help to trigger the retrieval of information among learners. It is also provides an effective measurement of knowledge and cognitive understanding. Also, a qualitative study by Sabiston (2024) has shown that multiple choice tests help to improve the learning outcomes.

3.3.2 Performance Rubric Assessment

This tool is focusing on the evaluation of participants' practical skills in the implementation of improved rice irrigation techniques and the appropriate use of mosquito nets. This tool can be used to make observation and provide a feedback on the actual application of the skills acquired from the training sessions.

A sample of performance criteria rubric

Criteria	Poor (1)	Fair (2)	Good (3)	Excellent (4)
Application of Irrigation methods	Unable to demonstrate the methods	Demonstrate limited understanding and inconsistent application	Demonstrate good understanding and application of methods with minor errors	Demonstrate full understanding and application of techniques
Appropriate use of Mosquito nets	Does not apply the techniques correctly	Exhibits limited knowledge of appropriate use of mosquito nets	Applies the methods with minor errors	Appropriately use the techniques without flaws
Overall effectiveness	Not effective	Fairly effective but needs major improvements	Mostly effective but needs minor improvements	Highly effective

Rationale for the use criteria rubric assessment:

Criteria rubric allows for holistic assessment of skills and practical use of techniques, which cannot be attained in the traditional assessment methods. This assessment helps to assess hands on training, which is important for sustainable farming practices and health intervention projects. Rubrics are important because they articulate learners expectations, thus provides them with motivation for learning (Brookhart, 2018). Similarly, Jonsson (2014) argues that rubrics make expectations explicit for students.

The implementation of both a multiple-choice assessment and criteria rubric may provide a comprehensive evaluation of the farmers understanding and the application of improved rice farming techniques and malaria prevention methods. These assessment strategies ensure the acquisition of knowledge and effective implementation, which in turn will contribute to the improved livelihoods and public health.

SECTION IV: IMPLEMENTATION PLAN AND FACILITATOR GUIDE

4.1 Background and Goals

Considering the growing threat of climate change and its effects on agriculture, the need for efficient irrigation practices is critical for food security (Darko et al., 2016; Miller et al., 2018). Additionally, malaria continues to be a major health concern in many agricultural regions, requiring preventative measures like the use of mosquito nets to mitigate it (Yang et al., 2018; Tizifa et al., 2018). This educational module aims to improve farmers' understanding of innovative rice irrigation techniques and the use of mosquito nets to mitigate malaria.

The goals of the module are:

- i. To train farmers on improved rice irrigation techniques that increase yield and conserve water.
- ii. To raise awareness about the health risks posed by malaria and demonstrate how to effectively use mosquito nets.

4.2 Introduction to the Unit

This unit focuses on smallholder farmers in areas where rice is a primary crop and malaria is prevalent. It will offer pragmatic, experiential learning opportunities that are directly relevant to the farmers' everyday operations.

4.2.1 Learning objectives

By the end of this module, participants will be able to:

- i. Identify and explain three improved rice irrigation methods.
- ii. Demonstrate the correct usage of a mosquito net and describe its importance in malaria prevention.
- iii. Assess how improved irrigation will affect their crop yields and household health.

4.2.2 Structure of this guide

This guide can be used by facilitators to present a thorough module on enhanced rice irrigation practices and mosquito nets to prevent malaria. It covers planning procedures, environmental factors, teaching methods, and evaluation techniques.

4.3 Pre-Workshop Planning

4.3.1 Preparing participants

Facilitators should ensure that participants are knowledgeable of the subject matter. Distribute a brief questionnaire to measure participants' initial knowledge and customize the instruction accordingly.

4.3.2 Student groupings

To promote peer learning, farmers will be divided into groups according to their levels of experience, such as novices and seasoned farmers. Hands-on practice and meaningful discussions will be facilitated by small groups of four to five participants.

4.3.2 Giving participants advance information

Participants will be sent an information packet outlining the workshop's objectives, schedule, and requirements to foster an understanding of what to expect and how to prepare for the module.

4.4 Instructional Environment, Equipment, and Materials

4.4.1 Considerations for the delivery environment

Participants will be emailed an information sheet explaining the workshop's objectives, timetable, and requirements to help them understand what to anticipate and how to prepare for the module.

4.4.2 Equipment and materials

They include the following items:

- Irrigation Demonstration Equipment: Simple irrigation tools (drip irrigation system, trowels).
- Mosquito Nets: Different types for demonstration.
- Visual Aids: Posters and flip charts illustrating irrigation methods and malaria facts.
- Projector and screen (for presentations)
- Laptops or tablets (for online sessions)
- Whiteboards/flip charts for group discussions
- Handouts: Worksheets summarizing key points for easy reference.

4.4.3 Handouts and media support

Along with access to a digital presentation shown during the course, each participant will get handouts outlining better watering techniques and mosquito net use.

4.5 Instructional Delivery and Sequencing

4.5.1 Overview of lesson

Outline the goals and objectives while highlighting the significance of malaria prevention and irrigation techniques. The teaching module is intended to keep learners engaged through demonstrations, discussions, and group activities.

4.5.2 Sequence of activities

Overview of the Lesson: Outline the aims and objectives, stressing the value of malaria control and irrigation techniques.

Activity 1: Group discussions on current practices (10 minutes).

Activity 2: Presentation on improved irrigation methods (15 minutes), followed by a video demonstration.

Activity 3: Hands-on practice using irrigation techniques (20 minutes).

Activity 4: Overview of malaria prevention (10 minutes), followed by a Q&A Session.

4.5.3 Step-by-step process

Introduce the goals and structure of the session.

- Present the first activity, highlighting the benefits of each irrigation method, allowing experimentation.
- Transition to malaria prevention with a hands-on mosquito net setup.
- Facilitate group reflection to solidify understanding and address questions.
- Conclude the session with take-home materials and encourage continued practice.

4.6 Assessment of Learning

4.6.1 Pre-assessment strategies

A short survey evaluating previous knowledge of irrigation and malaria techniques will be conducted to customize the course according to participant needs..

4.6.2 Formative assessment strategies

Facilitators will provide immediate feedback focused on observation during group work and hands-on participation. Additionally, facilitators will use questioning strategy to encourage reflection and critical thinking.

4.6.3 Summative assessment strategies

At the end of the module, participants will take a brief quiz covering the important subjects. A participatory evaluation form will also ask for feedback on the module itself.

The purpose of this guide is to provide facilitators with organized and usable frameworks for putting together a comprehensive lesson plan on improved ways to water rice and use mosquito nets to avoid malaria. Farmers are more likely to accept and execute these important practices in their communities if they are actively involved in practical settings.

SECTION V: EVALUATION PLAN

5.1 Overview

To effectively evaluate the impact of the instructional module, we will design a comprehensive evaluation plan that assesses the degree to which each goal is met. This evaluation will take place at multiple stages: before, during, and after the module implementation.

5.2 Steps for Evaluation

5.2.1 Pre-implementation phase

Baseline survey

A brief questionnaire will be administered to participants prior to the workshop. This survey will assess their initial knowledge and practices surrounding rice irrigation and malaria prevention measures (e.g., use of mosquito nets). This tool will help identify participants' starting points and will serve as a comparison to post-module data. Establishing a baseline allows the instructional designer to measure learning gained from the module (Miller et al., 2018).

5.2.2 During implementation phase

Formative assessments

Throughout the workshop, facilitators will observe participant engagement and understanding during group discussions and hands-on activities. Facilitators will use checklists to note participation levels and provide immediate feedback based on observation.

Questioning techniques

Facilitators will employ targeted open-ended questions to stimulate reflection among participants about best practices and the significance of malaria prevention. Formative assessments will help adjust instructional strategies in real-time and enhance participants learning as they engage with both concepts (Yang et al., 2018).

5.2.3 Post-implementation phase

Post-assessment

A follow-up survey will be administered immediately after the module to evaluate participants' understanding of the improved rice irrigation methods and the correct use of mosquito nets. This assessment will mirror the baseline survey to allow for direct comparison in knowledge and practices.

Outcome assessment

Participants will complete a brief quiz covering key topics covered in the module. Participants will also fill out a participatory evaluation form, providing feedback on the module's effectiveness, relevance, and suggestions for improvement.

Summative assessments are crucial for measuring the overall impact of the instructional module and understanding how effectively the learning objectives were met (Darko et al., 2016).

5.3 Evaluation Tools Development

5.3.1 Baseline & post-assessment surveys

These will be structured questionnaires (both digital and paper) containing multiple-choice and open-ended questions that evaluate knowledge, practices, and attitudes regarding rice irrigation and malaria prevention.

5.3.2 Participant engagement checklists

Facilitators will create checklists for informal observational assessments to gauge engagement during group activities and hands-on sessions.

5.3.3 Quiz and feedback forms

A template for a quiz, which may include multiple-choice questions, true/false questions, and short responses, will be developed along with a feedback form that asks specific questions about the module's content, delivery, and applications for participants' farming practices.

5.4 Linking Goals to Evaluation Components

Goal 1: To train farmers on modern rice irrigation techniques that improve yield and conserve water.

Evaluation Component: The post-assessment survey and quiz will measure knowledge acquired regarding improved irrigation methods.

This direct measurement links knowledge gains to the first goal and helps in understanding the immediate impact of instruction (Miller et al., 2018).

Goal 2: To raise awareness about the health risks posed by malaria and demonstrate how to effectively use mosquito nets.

Evaluation Component: The formative assessments during the session, coupled with the post-assessment survey, offer insights into understanding both the significance of malaria prevention and the correct practices associated with mosquito nets.

This dual approach ensures that participants not only understand the content but can also apply it in their daily lives (Yang et al., 2018).

This evaluation plan is designed to comprehensively assess the effectiveness of the instructional module in achieving the set goals. By employing a variety of assessment tools, we can effectively measure participant learning, engagement, and feedback. This data will offer critical insights to improve future iterations of the module and ultimately enhance the overall impact on community health and agricultural practices.

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