

TEACHING ENGLISH THROUGH THE TOPIC OF SUBSURFACE CAPILLARY IRRIGATION SYSTEMS

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Abstract: This article introduces the SCI system while also demonstrating a method to teach English vocabulary, grammar, and communication skills through agricultural science. Incorporating real-world topics into language education is an effective strategy for enhancing vocabulary retention and practical language use. One such topic is Subsurface Capillary Irrigation (SCI) — an innovative water-saving technology used in modern agriculture. Subsurface Capillarity irrigation is a technique that allows much better optimization of the use of water resources in the field of gardening, agriculture and home gardens. Capillarity is the ability of water to be able to filter to be distributed through all air spaces until they are covered.

Keywords: Subsurface, Capillary action, Evaporation, Root zone, Runoff, Moisture retention.

Introduction

Subsurface Capillary Irrigation is an underground watering method that delivers water directly to the plant root zone through capillary action. Unlike traditional surface irrigation, SCI reduces evaporation, minimizes water waste, and promotes efficient water use. Capillary irrigation is a form of subirrigation, which uses the capillary action of a medium to deliver water to a plant from a water source at or below the base of the

growing bed. Container-based subirrigated systems such as capillary mats, ebb and flow systems, capillary wicks, and subirrigated planters (SIPs) are all irrigation systems that depend on capillary action. These systems have been widely recommended in literature and guideline documents as they can grow healthy plants and flowers while reducing environmental impact, water demand, and irrigation effort. Capillary-based subirrigation systems have been widely applied in controlled environments for the growth of ornamental plants, and more recently for vegetables and fruit tree seedlings. Closed-cycle capillary irrigation is a promising technology for growing crops with minimal environmental impact; however, application of capillary-based subirrigation systems in small-scale commercial agriculture for growing fruits and vegetables in outdoor conditions has been limited.

Methods

How to Teach English Using SCI as a Theme:

During the English lesson, we use all comprehension skills to learn English. This approach develops all four-language skills together — listening, speaking, reading, and writing — in the context of one theme. It ensures balanced language development and deep understanding. For example:

- Reading a passage about SCI technology
- Watching a video and answering questions
- Discussing ideas in pairs or groups
- Writing a report or a persuasive letter

Vocabulary Building. Introduce learners to technical and semi-technical words related to agriculture and irrigation. Use images and real-life examples to demonstrate meaning.

Example: Match the word with its definition, or fill in the blanks using words like "moisture," "pipe," "soil. Subsurface - located below the surface - Capillary action - the

ability of water to move through narrow spaces without external force - Evaporation - the process of turning from liquid into vapor - Root zone - the part of the soil where plant roots grow.

Reading Comprehension provide a simplified article about SCI and ask students to answer comprehension questions. **Example:** "Why is SCI more efficient than traditional irrigation?" or "How does water reach the roots in SCI?"

Grammar Practice Use the content to reinforce grammar structures. **Example:** Passive voice - "Water is delivered directly to the roots." Conditional sentences - "If we use SCI, we can save more water."

Speaking Activities hold group discussions or debates: "Should farmers adopt SCI in dry regions?" Students can present pros and cons, practicing persuasive language.

Writing Tasks Assign essays or short reports: Example: "Describe how SCI works and explain its advantages." Encourage students to use transition words like firstly, moreover, however, etc.

Also we use **CLIL** (Content and Language Integrated Learning) method. This method combines the teaching of academic content with language instruction. Students learn about subsurface irrigation systems while improving their English skills. Through reading texts, watching videos, and completing tasks related to SCI, they acquire both technical knowledge and subject-specific vocabulary. In this approach, students complete real-life tasks using the target language. Tasks could include:

1. Preparing a presentation about how SCI works
2. Writing a comparison between traditional and subsurface irrigation systems
3. Designing a simple irrigation plan for a dry region

Language is acquired naturally, as learners' complete meaningful tasks.

Learners work in groups to carry out a project that leads to a final product or presentation. This method promotes collaboration, creativity, and purposeful language use. Example projects include:

- Creating a model of an SCI system
- Researching water conservation in agriculture
- Developing a proposal for implementing SCI in their local area.

Another method emphasizes interaction as both the means and goal of learning. Through such activities like role-plays (e.g. conversation between a farmer and an agricultural expert), group discussions (e.g. debating the benefits of SCI), students practice using English in their meaningful communication. Uses of diagrams, videos, presentations and images to enhance comprehension of complex ideas of the theme. For explaining theme about SCI, teachers can show: diagrams of subsurface water flow, videos demonstrating capillary action, comparative charts of irrigation efficiency. This approach benefits visual learners and makes abstract concepts clearer.

Results

In the context of language education, particularly English as a Foreign Language (EFL), teaching through scientific and technical content allows students to acquire both linguistic and domain-specific competencies. This dual-focused strategy enhances motivation, relevance, and real-world application of language skills. Students develop their listening, speaking, reading, and writing skills in an integrated and meaningful way. They expand and improve their technical and academic vocabulary (e.g., *capillary*, *irrigation efficiency*, *water retention*), use grammar structures such as passive voice and conditional sentences in context, and communicate ideas more clearly and confidently in both written and spoken forms. Learners gain a deeper understanding of the SCI system and related agricultural and environmental concepts. They learn how water moves through soil using capillary action understand how SCI supports sustainable farming and

water conservation; build foundational knowledge for further study in agriculture, environmental science, or engineering. They develop their Critical Thinking and Problem-Solving Skills. In addition, students engage with real-world challenges such as water scarcity and sustainable irrigation. As a result, they: analyze issues from different perspectives; propose practical solutions based on the SCI model; justify their ideas with evidence and present them in English.

Discussion

Through group discussions, presentations, and projects, students improve their ability to: organize and express thoughts logically; use subject-specific language effectively in conversations; speak in front of an audience with increased confidence. When learners see the real-world relevance of their lessons, they become more engaged and interested. They: participate actively in class activities; take ownership of their learning process; connect English learning with their future academic or professional goals. By working with authentic content and producing academic-style outputs, students are better prepared to: read and understand technical texts in English; collaborate in multilingual or multicultural environments; apply for international studies or careers in agriculture, engineering, or environmental science.

Conclusion

Teaching English through the theme of Subsurface Capillary Irrigation blends language skills with essential real-world knowledge. It enhances student engagement, builds technical vocabulary, and fosters awareness of sustainable agricultural practices. This content-based instruction approach not only improves language proficiency but also prepares students for future academic or professional roles in global industries like agriculture, engineering, or environmental science. By making language learning relevant and purposeful, educators can empower students to communicate effectively — and think critically — about the challenges facing our world today.

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