

Applying Learner Centered Approach in an Inquiry -Based Homemade Hydroponics Program
with Master Gardener Educators

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Introduction & Need for Strategy

As society changes, the needs of its people also change; this concept of change has been a key element in the design of adult education programs since the inception of the movement (Boone, 1973). Boone (1973) continues stating that from its formative years to the present, the adult education movement has placed much emphasis upon problem-solving by imparting knowledge and improved decision-making procedures.

The learning experience is mostly problem-centered and working adults are likely to be less enthralled by survey courses that are full-time as professional students. Adults tend to prefer single-concept, single-theory courses that focus on applying the concept to relevant problems (Boone, 1973). Therefore, an inquiry-based learning project growing vegetables in a homemade hydroponics system is being developed to promote scientific thinking among Masters-Gardener educators whereby an online module made of four lessons was delivered.

Connection to Literature

The lifelong learning experiences and education of adults become more complex due to intricate variables they must handle on the pursuit of success in life (Wlodkowski, 2008). The cognitive processes underlying scientific discovery and day-to-day scientific thinking have been a topic of intense scrutiny and speculation for almost 400 years (e.g., Bacon, 1620; Galilei, 1638; Klahr, 2000). Kirby, et al. (1999) describe creative thinking, organization, logical thinking, scientific thinking, persuasive thinking, and problem solving as all being part of critical thinking. Recognition of the need for critical thinking and decision-making processes is vital to meaningful adult learning. For the purpose of this program, scientific thinking refers to both “thinking about the content of science and the set of reasoning processes that permeate the field of science: induction, deduction, experimental design, causal reasoning, concept formation, hypothesis testing, and so on” (Dunbar & Klahr, 2012, p.611).

Inquiry learning can be used to train learners critical thinking skills. With inquiry learning, learners are actively involved in learning both physically and mentally (hands on activity) through experimenting activities, observing, asking, analyzing data, and making conclusions (Suryanti et al., 2018). Suryanti et al. (2018) continues stating that Learner centered inquiry learning has been shown to improve students' critical thinking skills and as critical thinking skills of the learner continue to develop, it should continuously be trained to adjust with the changing world. Adult education mirrors a society's current needs. Hence, current society's changing needs demand continuous and comprehensive education for adults throughout their lives. The rationale supporting the need for adult education relates to the nature of the various roles which responsible adults must perform in society. Adults bear constantly shifting roles which must be implemented throughout adulthood. A few such roles include those of worker, family member, citizen, and consumer. The implications for adult education relative to the performance of these roles are obvious (Boone, 1973).

How It Works & Implementation of Strategy

The concept used in this program aims at developing Master Gardener educators' scientific thinking as part of problem-solving skills by using online modules that focus on homemade hydroponics inquiry-based project. Key components that facilitate the learning includes four lessons which are (1) What is hydroponics and why it is important; (2) Homemade Hydroponics Design (what factors to consider, different designs, maintenance); (3) Guided inquiry guidelines (4) A scenario to help participants work on it (Wrap-up with example).

The first lesson mainly focuses on hydroponics system definitions, types and history. It also details environmental, health and financial benefits of using a homemade hydroponics. The second lesson details technical skills needed to assemble a homemade hydroponics system. It mainly focuses on what plants need to grow and how a homemade hydroponics system can be designed to fulfil those needs. The third lesson is a guided inquiry made of what a scientific inquiry means, the role of scientific inquiry and learners are taught guided inquiry steps while also they are explained how to use data in decision making. Finally, the last lesson is a practical guidance visually showing learners how to design and assemble a homemade hydroponics system.

After the online learning experience, participants design and construct their homemade hydroponics systems. They then perform a guided inquiry growing vegetables as a way to apply skills learned during the homemade hydroponics online modules. Finally, during the implementation of the guided inquiry, participants implicate components of scientific thinking

Results to Date / Implications / Impact

A need assessment survey was conducted to assess the prospective participants willingness to participate in the research. About 166 non-formal/informal educators were recruited to participate in this study. The majority (81%) identified themselves as home growers, and 92.6% acknowledged that they have heard about hydroponics before. However, 92% of the participants identified themselves as having very limited knowledge about hydroponics, while 95% mentioned that using hydroponics to grow food indoors can be a great educational activity to do with both youth and adults. Learners followed their own pace while learning with online module. Google Classroom were used as a learning platform. Throughout the program, learners were given assignments to do as part of the learning process to help them develop their scientific thinking throughout the learning process.

Future Plans / Advice to Others

Educators who endeavor to direct learners in acquiring skill in scientific thinking must have a clear-cut of the elements that constitute such thinking; they must be on the alert to detect and correct the errors that learners are most likely to make in the process (Downing, 1928). Despite a volume of research, controversy continues regarding how this strategy develops and how educators can best support its development. Therefore, continuing investigation and program development are warranted.

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