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ABSTRACT

Key concepts about best practices of curriculum design and program development for outdoor youth programs are discussed. These include: agreeing on curriculum criteria and coming to consensus on a balance between content and process skills; using experiential teaching modes; and pursuing youth-adult partnerships for community change. There is not a wealth of materials on boating, fishing, and environmental stewardship available in the national 4-H curriculum collections, but many states and counties are using local materials. This presents a key opportunity for partnerships to evolve. Researchers need to engage youth and adults in research-related activities defining best practices in: implementing youth-adult partnerships in diverse communities; engaging community-based youth-adult partnerships in creating their own experiential-based curricula; implementing interactive technology-based learning in community organizations; defining strategies for a community-youth development framework that creates community change; and developing an international version of this framework. Nonprofit organizations could work with youth development researchers and practitioners to create a sustainable grassroots movement that mobilizes youth and adult partners to conserve and restore our nation's aquatic natural resources by getting involved in boating and fishing. This lofty goal combined with integrating research and practice on youth-adult partnerships, experiential learning strategies, and the community youth development movement will help develop a sustainable learning community that brings about lasting change in how communities deal with issues related to boating, fishing, and environmental stewardship. (Contains 28 references.) (TD)

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Recommended Educational Practices for Youth Environmental Education From a 4-H Youth Development Perspective

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Abstract – Key concepts to keep in mind about best practices of curriculum design and program development for youth in non-formal settings include:

- It helps if the organization can agree on curriculum criteria and come to consensus on what is the balance between content and process skills.
- Teaching experientially is the preferred mode for non-formal education, but becoming proficient at designing learning experiences by mapping it along an experiential path continues to be a challenge.
- The late 80's ushered in the *Youth at Risk* movement fueled by research on risk and protective factors. This was counteracted in the early 90's with the youth asset driven model advocated by the Search Institute and has evolved into a *Best Practices of Positive Youth Development Model* that is fueled by a renewed commitment to meaningful youth/adult partnerships, experiential learning and civic activism.
- The paradigm shift from youth participation for *youth development* to youth—adult partnerships for *community change* (i.e. Community youth development) promises to be a natural evolution of the youth development movement.

Although there is not a wealth of materials on boating, fishing and environmental stewardship available in the National 4-H Curriculum Collections, many states and counties are using materials on a local level that truly work for them. This presents a key opportunity for partnerships to evolve. Both the Logic Model of program evaluation as well the Four-Fold Model designed to evaluate 4-H Youth Development curriculum are two major models that are currently being used in 4-H Youth Development programs.

Researchers need to utilize Youth–Adult Partnerships, which fully engage youth and adults in research related activities defining best practices focused on:

- Implementing youth–adult partnerships in diverse communities.
- Engaging community based youth—adult partnerships in creating their own experiential based curriculum.
- Implementing interactive technology based learning in community organizations.
- Defining strategies for moving from a positive youth development model to a community – youth development framework that harnesses the energy, creativity and dedication of both youth and adults to create community change.
- Developing an international version of this emerging community youth development framework that could be adaptable around the world.

Non-profit organizations, like the Recreational Boating and Fishing Foundation (RBFF), could work with youth development researchers and practitioners to create a sustainable grassroots movement to mobilize youth and adult partners to conserve and restore our nation's aquatic natural resources by getting involved in boating and fishing.
The author urges RBFF to continue to utilize marketing and education strategies to increase public awareness for protecting, conserving and restoring this nation's aquatic natural resources. This lofty goal combined with integrating research and practice on youth—adult partnerships, experiential learning strategies and the community youth development movement will help develop a sustainable learning community that brings about lasting change in how communities deal with issues related to boating, fishing and environmental stewardship.

Best Practice For Designing Curricula Materials

Development of National Criteria for 4-H Youth Development Curricula

For over 80 years 4-H curriculum materials evolved in a rather haphazard manner in each state. In fact, a 1986 survey found 40 different state 4-H Beef project materials. Therefore, there was a need to standardize criteria and collaborate as a truly cooperative system. The following criteria was created by the National 4-H Curriculum Developmental Committee, modified and piloted by the Youth K-3 (5-8) Task Force, amplified during the 1993 Curriculum Staff Pre-conference, and refined by the National 4-H Experiential Learning Design Team. They were then condensed and sharpened from 35 to the present 14 in a 3-round Delphi process involving nearly 300 staff from nearly all States and Territories. The criteria and procedures were revised 10/95, 10/97, 10/99, and will be re-examined annually. The National 4-H Curriculum criteria include the following 14 points:

Experiential Learning Methodology

- The instructional approach of the materials is experiential education. Through vital practice, young people actively learn, then share their experiences, reflect on its importance, connect it to real world examples, and apply the resulting knowledge to other situations.
- Opportunities are included for involving volunteers and youth as partners in planning, implementing and evaluating the learning process.
- Materials are user friendly, and identify the intended delivery mode(s) for the curriculum.

Learner Centered

- The educational materials include a variety of educational experiences for varied learning styles. They build on various knowledge bases and are applicable to real world situations and current societal issues.
- The reading level, subject matter, learning experiences, incentives and recognition are developmentally appropriate for the intended audiences and allow for varying participant experience levels.
- The educational materials encourage positive attitudes toward learning by being presented in a fun, appealing, engaging and challenging manner that is consistent with learning theories.

- The educational materials identify and target one or more outcomes or skills, which are highly transferable, broadly useful beyond the subject matter, or throughout life. These may come from any source, such as life-skills lists, workforce competencies, science process skills or internal assets, etc.
- The educational material is sensitive, reflective and respectful of audience diversity in income, race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, marital status or family status.

Subject Matter Content

- Uses research-based human development methodology and subject matter knowledge from the land grant system, other universities, and/or other sources. Facts and terminology are accurate, current, and used appropriately.
- Subject matter is used as a vehicle through which growth and development of the learner occurs.
- Design, format, and packaging of the educational materials are appropriate to the intended audience, the subject matter, and the media used.

Objectives and Evaluation

- Goals, outcomes or objectives are clearly stated. The educational materials appear to be efficient in the time, effort and materials necessary to achieve objectives.
- Evaluation experiences or tools are suggested or included which provide participants feedback on their accomplishments.
- Evidence is provided that participants using this material generally achieve the major objectives.

The National 4-H Curriculum Collection includes curricula, which have met each of the 14 specific criteria. Over 400 curricula have been submitted for review. Of these, 135 have been accepted into the National 4-H Curriculum Collection and are recommended for use in all states and territories. Forty-five of these, now over five years old have been removed. Citations for each item now in the National Collection can be found at this website:

http://www.reeusda.gov/4h/curricul/curricul.htm.

Defining Developmentally Appropriate Life Skills

One of the basic building blocks of 4-H Youth Development curriculum is the concept of teaching life skills. In 1973, in the "4-H in Century Three" planning document, state 4-H Leaders endorsed the notion that 4-H was not just about providing knowledge, skills and

understanding of subjects that the individual elects for personal involvement. In addition, 4-H had the dual purpose of building socially desirable "life skills" in boys and girls (Informal paper, Allan Smith, 1996), Over the past three decades 4-H Youth Development educators have struggled with how to clearly articulate and integrate life skills into curriculum materials. On major contribution to this dialogue was Dr. Patricia Hendricks' Targeting Life Skills Model (1996, revised 1998).

The Targeting Life Skills model was important for it provided 4-H Youth Development curriculum designers with a set of resources to help them:

- Better understand life skill development by using the 4-H clover to identify and sort 35 life skills .
- Clearly define the appropriate developmental level for each of these 35 life skills.
- Write life skill development impacts that are measurable.
- Create learning opportunities based on experiential learning theory.
- Use identifiable observable indicators to measure program impact.

Toward a Better Understanding of the Experiential Learning Model

The Targeting Life Skills handbook provided Curriculum Designers with tools to better integrate life skills into 4-H materials and served as a major building block for 4-H Curriculum Specialists. The concept of life skills was broadened with the Four-Fold model that combined four existing models into one comprehensive model:

- The SCANS Workforce Preparation model (1991).
- The Science Process Skill model developed by the National Network for Science and Technology (1997).
- Iowa State University's Targeting Life Skill model (1998).
- The Search Institute's Internal Assets model (1998).

This comprehensive model focuses on the four-fold development of an individual youth's head, heart, hands and health and encouraged 4-H Youth Development educators to target one or more outcomes or skills which are highly transferable and broadly useful beyond the subject matter, or throughout life. These skills are not just 4-H life skills, but may come from other sources, such as workforce competencies, science process skills or internal assets, etc.

Still the debate raged on between subject matter specialists and youth development specialists as to what was more important—life skill development or acquisition of subject matter knowledge. In 1998, Dr. Robert Horton, a curriculum specialist at Ohio State Cooperative Extension noted that 4-H curriculum designers:

> *Assumed an either-or posture; one either supports a design with the content as the core or a design with skills at the core. Recently, however, experiential curriculum designers have conceded that we need to meld our curricular concerns relating to both the subject matter of the curriculum and the personal skills of the learner. The whole intent is to get students more meaningfully involved with content so that more of the knowledge and skills stick by allowing them to take more responsibility for their learning." One of the best ways to do this was to design materials using the Experiential Learning Model.*

Now that 4-H curriculum designers seemed to agree that they needed to design curricula that blended both life skills with subject matter content, they needed to get a better handle on the Experiential Learning model. Educators would nod their heads and agree that the Experiential Learning Model was important, for it supported the age old 4-H slogan of *learn by doing*, but most people did not have a real clear idea about how to design experiential learning activities. Many curriculum designers became comfortable using the format advocated in the 4-H Animal Science Skills for Living series, that was useful at it's time of introduction in the early 90's, but found this approach was not adaptable for all 4-H project areas.

Barkman and Horton (1999) defined Experiential Education as:

- Based on the needs and interests of the learner.
- Utilizes non-formal instruction.
- Learning facilitator is present.
- Experiences are organized in a way that moves learners through four distinct phases; introduction, exploration, generalization and applications.

In *Experiential Learning: Experience as the Source of Learning and Development* (1984), Kolb describes experiential learning as a holistic, integrative approach. Kolb postulates that instructional content is best organized along an ***experiential path***, where

learning takes place as a series of transactions among four adaptive modes:

- Concrete experience
- Reflective observation
- Abstract conceptualization
- Active experimentation.

Horton et al. (1999) suggest an eleven-step model for the Developing Experientially Based Curriculum Materials and Evaluation of Experientially Based 4-H Curriculum. These steps include:

Part I - Framing the Unit
Step 1: Establish the Unit's Theme
Step 2: Assess the learner's needs and interests, define the context in which learning will occur and determine how curriculum will be packaged.
Step 3: Write performance outcomes.

Part II – The Curriculum Planning Process
Step 4: Develop scope and sequence.
Step 5: Determine depth of experience for each topic.
Step 6: Design learning activities.
Step 7: Develop facilitation activities.
Step 8: Complete written draft of entire curriculum.
Step 9: Design Pilot version with layout and graphics.

Part II – Verification and Revision
Step 10: Conduct pilot test and revise.
Step 11: Print or produce final curriculum.

Horton et al. (1999) reviewed the work of 19 individuals to develop this prescription for operationalizing experiential curriculum philosophy. Their model provides an in-depth description on how to integrate the experiential learning model into the curriculum design process. Horton attempts to get at the *heart of experiential learning* by encouraging curriculum designers to organize content in a manner that takes into account how individuals develop and learn. He encourages learning facilitators to feel free to skip around and address content based on the interests of the learner. A variety of approaches can be used to *map out the experiential*).

Let's closely consider these four steps of Horton's curriculum design model.

Step One: Organize themes around the interests of the learner, rather than on the demands of academic subjects.
Step Two: Determine the depth of experience for the content by mapping along the experiential path.
Step Three: Construct learning activities that address content at its assigned location along the experiential path, with consideration for content outcomes and the skill set.
Step Four: Provide evidence that *experiential processing* takes place.

In this non-formal setting, teachers are cast as facilitators of learning rather than directors as characterized in all formal situations. If taken seriously, these four strategies really help to strengthen the experiential learning process. Horton also encourages curriculum designers to create ways for others to intervene in the learning process by providing focus, support and feedback, and debriefing. Creating experiential learning environments is not easy task, but these strategies are a start. Horton's work gave 4-H youth development professionals the tools to create curriculum materials based on utilizing current research on experiential learning, rather than just using a *cookie cutter* approach for mass producing volumes of *look alike* 4-H project manuals based on only one successful curriculum format. Now let's look at the parameters of best practice in youth development programs.

Best Practices Supporting Youth Development Programs

Zeldin (2000) noted that it is hard to believe how quickly the phrase *positive youth development* became ingrained in the language of research and practice. Preventing youth problems dominated research and policy agendas throughout the 1980's and into the early 1990's. Classic examples of this orientation include Dryfoos (1990) and Jessor (1977). Youth at Risk was the buzz phrase of the 80's supported by research on risk and protective factors. The early 90's saw the expansion and consolidation of lessons learned from prevention and other risk-oriented models along with a revisitation of theory and practice in experiential and civic education. This resulted in an emphasis on youth issues and associated recommendations for policy and practices. This approach was labeled ***positive youth development.*** One of the major forces in this movement that was the work done by the Search Institute on developmental assets.

Search Institutes Asset Model

Since 1990, the Search Institute has been refining a framework of 40 developmental assets. This influential framework has laid the groundwork for best practices of youth development to evolve to its present state. Many youth development educators across the nation have considered these factors as they have de-

veloped programs to help youth grow to be healthy, caring and responsible.

The Search Institute is an independent, nonprofit, nonsectarian organization whose mission is to advance the well being of adolescents and children by generating knowledge and promoting its application. To accomplish this mission, the institute generates, synthesizes, and communicates new knowledge, convenes organizational and community leaders, and works with state and national organizations.

At the heart of the institute's work is the framework of 40 developmental assets, which are positive experiences, relationships, opportunities, and personal qualities that young people need to grow up healthy, caring, and responsible. Created in 1990, the framework is grounded in research on child and adolescent development, risk prevention, and resiliency. Surveys of more than one million 6th-12th-grade youth in communities across the United States consistently show that young people who experience more of these assets are more likely to make healthy choices and avoid a wide range of high-risk behaviors. The relative absence of these assets in the lives of young people in every community studied has prompted hundreds of communities to mobilize on behalf of young people.

External Assets

The first 20 developmental assets focus on positive experiences that young people receive from the people and institutions in their lives. Four categories of external assets are included in the framework:

Support - Young people need to experience support, care, and love from their families, neighbors, and many others. They need organizations and institutions that provide positive, supportive environments.

Empowerment - Young people need to be valued by their community and have opportunities to contribute to others. For this to occur, they must be safe and feel secure.

Boundaries and expectations - Young people need to know what is expected of them and whether activities and behaviors are *in bounds* and *out of bounds*.

Constructive use of time - Young people need constructive, enriching opportunities for growth through creative activities, youth programs, congregational involvement, and quality time at home.

Internal Assets

A community's responsibility for its young does not end with the provision of external assets. There needs to be a similar commitment to nurturing the internal qualities that guide choices and create a sense of centeredness, purpose, and focus. Indeed, shaping internal dispositions that encourage wise, responsible, and compassionate judgments is particularly important in a society that prizes individualism. Four categories of internal assets are included in the framework:

Commitment to learning - Young people need to develop a lifelong commitment to education and learning.

Positive values - Youth need to develop strong values that guide their choices.

Social competencies - Young people need skills and competencies that equip them to make positive choices, to build relationships, and to succeed in life.

Positive identity - Young people need a strong sense of their own power, purpose, worth, and promise.

Best Practice of Youth Development Programs

From 1993 to 1995, a nationwide project was launched to answer the fundamental question: "What are the day-to-day experiences that are essential for young people to be able to participate successfully in adolescent and adult life?" The answer, based on evidence from a review of 12 task forces and synthesis reports, and a review of more than 200 research studies is simple. Young people need access to safe places, challenging experiences, and caring people on a daily basis (Zeldin & Price, 1995).

In February 1999, Wisconsin 4-H Youth Development staff engaged in an initiative to confirm and expand these research findings by gaining the collective knowledge and wisdom of the those who work with youth in the field. All staff participated in a series of conference activities and shared learning exercise to further explore the essential experiences, an equally important, to identify ***best practices*** that are associated with the essential elements (Zeldin, Day & Matysik, 1999).

During 1999, these ***essential experiences*** and ***best practices*** were presented to staff and discussed throughout Wisconsin. Modifications were made accordingly. This consistency across research and experience was the basis of the work with the Program and Activity Assessment Tool (PAAT). This tool is intended to assist youth development professionals in assessing the level of essential opportunities and sup-

ports that must be in place in order for youth to have healthy and rewarding experiences. The directory of Best Practices includes the following items.

Youth need opportunities for:
- Exploration and Reflection
- Expression and Creativity
- Group Membership
- Contribution and Service
- Part Time Employment.

Youth need support through:
- Nurturance and Friendship
- Emotional Safety
- High Expectations
- Standards and Boundaries
- Access to Resources.

Youth programs need organizational support such as:
- Trained professionals and volunteer staff
- Partnerships and collaborations
- Regular evaluation and assessment.

Zeldin (2000) emphasizes that this directory is obviously not exhaustive. It merely illustrates how researchers and practitioners articulate what the essential experiences *look like in practice*. The purpose of this directory is to provide grounding for using PAAT. This tool can help youth development professionals strengthen their programming regardless of the setting in which they are working

This concludes the discussion on program development models. One can see how the practice has evolved from the prevention model of the 80's that focused on risks and negative behavior, then swung to the asset model that focussed on the positive things youth need to possess. The current *positive youth development* model advocated by Zeldin (2000) and others appears to be an evolution of both the prevention and asset model and moves on to identify *best practices* associated with the essential elements of positive youth development. Now let's look at some key youth leadership models that are supporting current youth development practice.

Best Practices for Youth Leadership Models

The Youth—Adult Partnerships Leadership Model

The spirit and philosophy behind the Youth—Adult partnership leadership model is nothing new. In fact, in 1974 the National Commission on Resources for Youth advocated a partnership model in which "There is mutuality in teaching and learning and where each age group sees itself as a resource for the others and offers what it uniquely can provide". This coupled with youth power in decision-making distinguishes youth-adult partnerships from parent-child, student-teacher and mentoring relationships. For example, mentoring emphasizes different principles such as:

- Helping youth develop a specific skill.
- Providing nurturance (adults giving youth the care and support that they need to thrive).
- Generativity (i.e. adult mentors passing on knowledge and wisdom to their young).

In contrast, youth-adult partnerships are a key strategy for community building. Camino (2000) noted three major premises of this movement:

- Strong communities are built on active participation and civic engagement of all members.

- Youth development is predicated on a larger focus on building healthy communities. If youth are able to participate in civic and public affairs as participants, not solely as beneficiaries, they tend to experience optimal development.
- Adults can overcome negative attitudes and misinformation about youth if they join with youth to address community concerns.

The Next Paradigm Shift: From Youth Participation for Youth Development to Youth—Adult Partnerships for Community Change

Young people do not grow up in programs they grow up in communities. The argument that meaningful participation is critical to youth development has been well documented. But the idea that youth participation is critical to community change has not been firmly embraced (Pittman, 2000). Pittman goes on to note that the next definition shift will be from "problem youth" to "problem solvers". Pittman warns about the danger of the "early investment" push, combined with the lingering "fix then develop" mentality which makes it less likely that young people most in need of services and opportunities will get them. Pittman notes that, "We will do a disservice to all young people if we do not find ways to create the public idea of youth as change agents: one that starts rather than concludes with the engagement of young people whose lives and communities are most in the need of changing." Pittman closes by challenging readers that to maximize impact, youth participation must be seen as:

- Critical to the immediate well being of communities and institutions not just the youth involved.

- Occurring everywhere, not just in separate youth specific projects.
- Involving learning and work, as opposed to uncompensated volunteering which is detached from career interests.
- The right and responsibilities of all young people.

One entity that continues to push the concept of *community youth development* is the Innovation Center for Youth Development and Community Development. This is a division of National 4-H Council. It's mission it "To advance the 4-H youth development movement to build a world in which youth and adults learn, grow and work together as catalysts for positive change". The Innovation Center promotes effective tools and strategies for engaging youth and adults as partners in creating positive community change in both urban and rural areas. Guiding principles that drive this organization include the following:

Guiding principles —Youth

- Young people bring valuable experience, knowledge and ideas to ventures. When their contributions are included, everyone benefits.
- Young people and adults can be equal partners in building communities and creating change. Youth/adult partnerships are powerful, effective, and practical.
- Youth development focuses on youth as who they are now, not only on youth as future adults.

Guiding Principles — Youth Development

- Effective youth development addresses root causes and builds on existing assets.
- Youth are integral parts of networks that include family, school, community and society. So everyone has a stake in youth development, and every institution can find meaningful roles for youth.
- Discrimination in any form limits the realization of young people's potential.

Focal points of their work include:

Youth Development and Governance — The Innovation Center helped launch the *At the Table* initiative in response to a growing national movement to increase youth involvement in community decision-making.

Youth Development and Philanthropy —The involvement of young people in the fund raising process opens up opportunities for youth to learn about and incorporate the philanthropic spirit, while allowing them to claim their rightful place where decisions are made.

Youth Development and Technology —Through projects with partners and communities across the country, the Innovation Center is helping to create resources for using technology as a tool for positive youth development and community development. In addition, the Innovation Center serves as host to an array of e-communities.

Youth Development and Civic Activism—Many young people care deeply about the challenges their communities face and want to work to create positive change. And, some young people find themselves outside the boundaries of prevailing youth development programming and are motivated by the desire to change the societal forces that relegate them to the margins. The Innovation Center is exploring the practical tools for integrating elements of identity and civic activism into youth development practice.

Source: http://www.fourhcouncil.edu/cyd/

Summary of Best Practices of Youth Development

This is but a snapshot of some of the more innovative youth development programs that are developing all across America and is not meant to be exhaustive. Some of the key concepts to keep in mind about best practices of curriculum design, program development for youth in non-formal settings include:

- National 4-H Curriculum Criteria have raised the quality of curriculum products that are now available through national distribution channels like National 4-H Council and the 4-H Cooperative Curriculum System. State curriculum coordinators no longer feel the need to purchase only curriculum materials produced in their state. Therefore it helps if organizations can agree on curriculum criteria.

- Most youth development educators and 4-H volunteers now agree that they should target one or more outcomes or skills. They also seem to agree that life skill development is equally as important as the acquisition of subject matter knowledge and is the basis of deciding WHAT is important for youth to learn. Therefore, organizations need to come to consensus on what is the balance between content and process skills.

- Youth Development educators now agree that teaching experientially is the preferred mode for non-formal education and they are in the process of becoming proficient at designing learning experiences by mapping them along an experiential path. This continues to be an ongoing learning experience, with multiple levels of complexity.

- The late 80's ushered in the *Youth at Risk* movement fueled by research on risk and protective factors. This was counteracted in the early 90's with the youth asset driven model advocated by the Search Institute and has evolved into a *Best Practices of Positive Youth Development Model* that is fueled by a renewed commitment to meaningful youth/adult partnerships, experiential learning and civic activism.

- The new paradigm shift from youth participation for *youth development* to youth—adult partnerships for *community change* (i.e. Community youth development) promises to be a natural evolution of the youth development movement.

This concludes the discussion on the parameters of best practice in 4-H Youth Development. Let's now consider how these best practices relate to accomplishing the goal of boating, fishing and stewardship education.

Best Practices For Boating and Stewardship Education

In the discipline of 4-H Youth Development, topics such as boating, fishing and stewardship relate most directly to programs in Environmental Science. Basically, most of the *Best Practices of Youth Development* as described under Task #1 of this paper are also pertinent to youth environmental education programs in boating, fishing and stewardship education. For example, the National Network for Science and Technology (NNST) has broadened the National 4-H Curriculum Criteria so that it is pertinent to their field of study. Youth—adult partnerships are important regardless of what the topic is, and the *Best Practices for Youth Development* are universal concepts that could be embraced by all. However, here is a more focused look at best practices for youth by looking at it through the lens of Environmental Science programs.

In 1997, the National Network for Science and Technology of the Cooperative Extension Service wrote two significant papers related to science education. They were:

- Science Guidelines for Non-formal Education.
- Nurturing Scientific Literacy Among Youth Through Experientially Based Curriculum Materials.

This network supported collaboration among universities and community-based programs in the Cooperative State Research, Education, and Extension Service (CSREES). The first document, Science Guidelines for Non-formal Education focuses on WHAT to teach and the second on, Nurturing Scientific Literacy emphasized HOW to teach it.

Science Guidelines for Non-formal Education

Science standards have historically set the course for science literacy in the United States for formal K-12 educators. However, little has been done to encourage science efforts out of school. The Science Guidelines for Non-formal Education are developed to help youth educators and volunteer leaders understand the importance of nurturing the skills necessary for a scientifically literate society. Participants in non-formal science education programs, who are able to initiate intelligent discussions about science and technology, are more employable due to their knowledge of science and their ability to use technology. They can also understand science for enjoyment and personal gain (Carlson and Maxa 1997).

Part 1: The Scientific Thinking and Processing Skills
- Observing
- Communicating
- Comparing and measuring
- Ordering
- Categorizing
- Relating
- Inferring
- Applying

Part 2: Eight categories of Content Guidelines
- Scientific inquiry
- Physical science
- Life Science
- Earth & Space Science
- Science and technology
- Science in personal and social perspectives
- History of science
- Unifying concepts and processes in science

Part 3: A teaching model for technology
- Identify problem
- Create a solution
- Test the solution
- Rethink and make changes

Part 4: Leaning and teaching in non-formal settings

- Invention – Knowledge is actively created or invented by youth.
- Reflection – Youth create knowledge through reflection.
- Interpretation – Individual interpretations of the world are reality.
- Social Processing - Learning is a social process that goes on within a culture.
- Sense making – Science is sense making for the individual learner (Driver & Leach, 1993).

The youth driven model asks:
- What do I want to learn?
- How do I want to learn it?
- How do I want to show what I've learned?

The document on *Science Guidelines for Non-formal Education* have thoughtfully outlined WHAT to teach to prepare youth for the workforce as well as providing a vision for scientific literacy for the 21st century. The companion piece to this document entitled *Nurturing Scientific Literacy Among Youth Through Experientially Based Materials* will describe HOW to teach by describing science activities that adhere to these guidelines.

Nurturing Scientific Literacy Among Youth Through Experiential Based Curriculum Materials

In this publication Horton et al (1999) formalizes the process for developing experientially based non-formal science teaching materials. Based on Kolb's (1984) definition of experiential education, the publication demonstrates how all planned learning episodes can be accommodated within an experiential framework. This includes organizing content along an experiential path, identifying instructional methodology and science life skills necessary to teach the content, using an experiential facilitation process to guide the learner gathering the content and delineating post-unit assessment techniques.

Related Environmental Products in the National 4-H Curriculum Collection

4-H Youth Development educators will find that this discussion on scientific literacy overlaps with many of the typical 4-H projects related to Environmental Education and Earth Science, Environmental Stewardship, Earth, Water and Air as well as Plant and Animal Science. Here's a brief review of existing curriculum materials that relate to the boating, fishing and stewardship education.

Environmental Education and Earth Sciences Curriculum Materials

- New Jersey 4-H Science Discovery Series - 1996, Rutgers University

Environmental Stewardship (general)
- Building Common Ground - 1994, National 4-H Council
- Cycling Back to Nature: Food Production and Pesticides - 1995, National 4H Council
- Cycling Back to Nature: Soils Alive - 1995, National 4H Council
- Cycling Back To Nature With Biodegradable Polymers - 1994, National 4H Council
- Mud, Muck and other Wonderful Things - 1995, National 4-H Council

Earth, Water and Air
- Earth Connections - 1992, University of Florida
- 4-H Wetland Wonders - 1998, Oregon State University
- Give Water a Hand - 1996, University of Wisconsin
- Issues Investigation - 1998, 4-H Cooperative Curriculum System
- Soil, Water, and Land Use - University of Florida
- Teen News Network: Groundwater Update - 1993, Michigan State University
- Water Wise Guys - 1992, University of Florida
- Water Education - 1991, Utah State University

Key sources of 4-H Youth Development curricula materials include:
- National 4-H Council Bookstore http://www.4-Hmall.org/ & Source Book.
- 4-H Cooperative Curriculum System (4HCCS) http://www.n4hccs.org/.
- National 4-H Web – Projects: Environmental Education (Note that not all of these materials listed on this web page have passed the national 4-H Curriculum jury.) See http://www.4-h.org/projects/environment/index.html.

Under development by the 4-H Cooperative Curriculum System (4HCCS)
- 4-H Fishing project materials have been pilot tested and introduced at the fall 2000 4-HCCS product premiere and are currently in the production stages.

These fishing materials will be available fall 2001 and could present an excellent opportunity for 4-H Youth Development agents across the nation to partner with the Recreational Boating and Fishing Foundation. As

soon as a copy is available, this author could forward on a preview copy to Recreational, Boating and Fishing Foundation if they are interested in pursuing this partnership.

Summary Best Practices for Environmental Education Programs

Although there is not a wealth of materials on boating, fishing and environmental stewardship available in the National 4-H Curriculum Collections, many states and counties are using materials on a local level that truly work for them. This presents a key opportunity for partnerships to evolve, for the principles outlined for youth development programs in Task One of this paper generally are applicable across environmental education and natural sciences, as will as other fields.

Appropriate Evaluation Methods

One successful evaluation method that the University of Wisconsin Cooperative Extension has used for gauging program effectiveness is the Logic Model. The central questions that this model asks is:

- What difference are we making?
- How will we know it?
- What is the public value of the program?
- Are we doing the right things?

In the mid 1990s, the University of Wisconsin-Extension (UWEX) began using a logic model in response to GPRA (Government Performance and Results Act) requirements and to build a common language for accountability and evaluation across the organization. The UWEX logic model depicts the theory or action of a program in a graphic display that links program investments to program results. The model draws on experience with the USAID Log Frame (~1971) and the Bennett hierarchy of program effectiveness (Bennett, 1982; later with Rockwell, 1995) long a program evaluation tool in Cooperative Extension nationwide.

The Logic Model contains six components with Inputs-Outputs-Outcomes being central to the model:

Situation: the context and need that gives rise to a program or initiative; logic models are built in response to an existing situation.
Inputs: the resources, contributions and investments that are made in response to the situation.
Outputs: the activities, products, methods, and services that reach people and users.
Outcomes: the results and benefits for individuals, groups, agencies, communities and/or systems.
Environment: the surrounding environment in which the program exists, which influences the implementation and success of the initiative, including politics, climate, socio-economic factors, market forces, etc.
Assumptions: the beliefs we have about the program, the participants and the way we expect the program to operate; the principles that guide our work. Faulty assumptions may be the reason we don't achieve the expected outcomes.

Many logic models include *Activities* as a separate element in the *chain of action* and seem not to emphasize participation or reach. This model classifies *Activities* as Outputs where they have also included *Participation*. This has:

- Helped to simplify the model and language.
- Helped focus on outcomes versus outputs.
- Helped to attend equally to the important aspect of who participates, or is reached, which was central to WI programming and diversity goals.

UWEX uses the logic model in program planning as well as in evaluation. They are finding the logic model equally helpful in planning and evaluating group work, teamwork, community-based collaboratives and complex organizational processes in order to promote results-based performance. Such logic models are expanded to include a process *chain of action.*

The UWEX logic model serves as the conceptual framework for the institution-wide Impact Indicator Initiative based in the UWEX Vice-Chancellor's office. A variety of training and professional development offerings are available to help faculty, staff and partners understand and use the logic model. for more information, go to:

uwex/edu/ces/pdande/evaluation/logicmodels.htm

Four Fold Model for Evaluating Curriculum

To strengthen curriculum design and evaluation, Barkman and Machtmes (2000) also urges all youth development professionals to use a common language. Therefore she has used the Logic Model described by Taylor-Powell (1999) to show the flow between inputs, outputs and outcomes and uses this as the evaluation framework for her Four-Fold Model. (http://www.four-h.purdue.edu/fourfold/).

The *Four-Fold Youth Development Model* encompasses the breadth of the youth development field by focusing on the four-fold development of an indi-

vidual youth: their head, their heart, their hands, and their health. This enables youth to become confident, capable, caring, and responsible citizens. Youth development professionals around the country are using this easy-to-use research based model. The web site (that is currently under development) provides instruments that yield reliable, valid data and a method for data entry. An instantaneous on-line data analysis is generated as well as a printable report. This process makes the Four-Fold Model a very cost effective evaluation tool for youth development professionals who are interested in evaluating specific life skills.

The *Four-Fold Youth Development Model* is based on an extensive search of both theoretical and empirical research. The following databases are utilized for the literature search: ERIC, DAI (Dissertation Abstract Index), PYSCH Index, Social Science Index, and Academic Full Text. The model encompasses 47 youth development skills that youth will need to develop into confident, capable, caring, and responsible citizens. It combines four existing models into one comprehensive model focusing on all four aspects of the individual: their head, their heart, their hands, and their health. The four models included are the *SCANS Workforce Preparation Model, NNST Science Process Skill Model* developed by the National Network for Science and Technology, Iowa State University's *Targeting Life Skills Model*, and the Search Institute's *Internal Asset Model*. This model has encouraged 4-H Youth Development educators to broaden their sometimes-limited view of the 4-H club or project experience to include other educational theories and approaches beyond the simplistic 4-H life skill model.

Barkman et al. (2000) presents a practical way to design and measure the impact of youth development curriculum materials. Evaluation is seen as an integral component of the curriculum design process, not just something that happens at the end. Thiagarajan (1990) suggests that there are two major phases of evaluation: formative and summative. The primary focus in the formative phase is on improving the effectiveness of the curriculum while on the other hand, the focus in summative is on proving that the curriculum achieves its stated performance outcomes. Barkman model includes two basic types of evaluation tools: design team checklists and evaluation checklists. Features that make this Four- Fold Model unique include:

- Inclusion of components, or skill sets, for each individual skill.
- Inclusion of research study abstracts, rather than just a synopsis
- Provision of sample educational activities and curriculum references
- Linkage to File Maker Pro database software package to easily analyze data.

The Four-Fold model web site is already having a tremendous impact on the youth development field. Barkman et al. (1999) hopes that the greatest impact will be to generate a national database with comprehensive indicators that can be used to further research in youth development. This website will then provide program evaluation tools and analysis for all youth practitioners as well as become a database for mining by youth researchers.

Summary of Evaluation Methods

In this section there has been a review of both the Logic Model of evaluation as well as how this has been used as a basis of the Four-Fold Model which was designed to evaluate 4-H Youth Development curriculum. There are probably many other approaches, but these are two major ones that are currently being used in 4-H Youth Development programs

Gaps in Best Practices for Youth Development Education

Missing Curriculum Resources

There are some environmental education materials in the National 4-H Curriculum Collection, as well as five items on water alone, but this is hardly enough to satisfy the needs of over 5 million youth and adults involved nationally in 4-H Youth Development programs. There currently are no boating or fishing curriculum materials in the National 4-H Curriculum Collection, although many 4-H programs are happening at the local level where local partnerships exist. This presents a huge opportunity for collaboration and partnerships between 4-H Youth Development and Recreational Boating and Fishing Association. And as mentioned previously, the 4-H Cooperative Curriculum System has been developing national 4-H fishing materials that will be available fall 2001.

Integrating Research and Practice

Zeldin (2000) noted that, "Over the past decade, research and practice have made almost-independent contributions to our knowledge base about adolescent development." Greater integration is recommended. Experimenting with and building theory through the interplay of research and practice will maximize our knowledge of positive youth development in the community context, while at the same time demonstrating how to promote it. Finally, this will challenge re-

searchers to connect their agendas with those of practitioners, and vice versa. Zeldin (2000) goes on to offer four proposals for integrating research and practice:

- Orient research and practice toward conceptualizing, understanding and achieving positive, community-level outcomes.
- Understand and improve adult attitudes and policy towards youth and their potential.
- Explain and confront the isolation that exists among young people and adults both in community and in community decision-making.
- Marshall all forms of scholarship to prepare nonprofit managers to build capacity for adolescent development.

However, the gap between the researcher and practitioner is still wide even though the Wisconsin 4-H Mission is to integrate research, education and community-based partnerships, enabling youth to learn and practice skills to be productive citizens. (Hutchins 1999) Much work still needs to be done to achieve Wisconsin's vision where 4-H Youth Development is a catalyst for positive community youth development in all Wisconsin counties. However, articulating a vision and mission is the first step toward achieving this lofty goal, and grassroots work is moving along to fuel this movement across the entire state of Wisconsin.

Experiential Learning

The experiential learning theory has been around since John Dewey (1963). Many youth development researchers can talk the talk, but the true masters of the craft of *experiential learning* are often practitioners in the field. That's why many researchers are now involved in action research studies where they actually roll up their sleeves and get involved in local youth development efforts. These research/practitioners have honed their craft to a fine art that often defies traditional quantitative research methods. More qualitative studies need to be conducted to truly describe *the best practices of teaching experientially.*

In 1997 Horton and Hutchinson recommended:

- The development of a valid experientially based science curriculum materials for non-formal education and a call to devise a strategic plan of action for change.
- A concerted effort on the part of 4-H Curriculum specialists nationwide to utilize the recommendations to develop curriculum products.
- Additional research on evaluating experientially based 4-H science curriculum materials from both content and product perspectives.
- Continue to refine the process and instrumentation for determining product reliability during pilot phases of the curriculum development process.

Horton's recommendations were the impetus for the development of the Four-Fold Youth Development series of publications. The first one, 4-H 897 -- Developing Experientially Based 4-H Curriculum Materials focuses on the way in which teaching materials are created, especially the actual arrangement of the parts of the finished product. The second publication, 4-H 898 -- Evaluation 4-H Curriculum through the Design Process, focuses on the pilot testing and data collection phase of curriculum development. It contains both checklists for use by the design teams and evaluation instruments to measure whether the curriculum achieved its stated outcomes.

More research needs to be done to see if the curriculum design model advocated by Horton and Barkman truly does develop experientially based curriculum materials that both provide formative data on how to improve the materials, as well as summative data on providing that the curriculum achieves it stated outcomes. This work is still under development and needs an army of youth development professionals to utilize the on-line evaluation instruments to contribute to the body of knowledge.

Youth—Adult Partnership (Y/AP) Gaps

Camino (2000) notes that current societal forces are again beginning to give greater legitimacy and acceptance to youth – adult partnerships. Camino identifies the following research gaps:

- Practitioners need to be aware of these three dimensions of Y/APs and to gear their research around these concepts of:
  a. Principles and values, which actors use to orient the relationship and to guide behavior.
  b. A set of skills and competencies through which the behaviors are focused.
  c. A method to implement and achieve collective action.
- Researchers should consider how *settings* and *context* figure significantly in the creation of Y/APs. Training alone cannot achieve infusion of Y/AP's without considering both overt and subtle established structures and relationships of power.
- Both youth and adults need consistent access to support as they engage and support Y/APs.

- Researchers need to don different lenses and be willing to challenge established views of adolescents and their potential, as well as investigate the power dynamics that maintain segregation of youth and adults.

Basically, youth development educators have been talking about youth—adult partnerships since the 70's. The theory is in place to advocate such a model, but to successfully support and facilitate such a model is easier said than done. This author has been working with the Wisconsin 4-H Technology Team, as well as with the Dane County 4-H Public Adventures group for the past three years. Based on these personal experiences, she has found that establishing a productive youth – adult partnership is truly an art and demands a high degree of tenacity and hard work, but the lessons learned are well worth the effort! For unless researchers are willing to roll up their sleeves and get involved in the messy business of *real life youth development* and test their theories in the field, the parameters of best practices will never truly advance.

Lack of Research on Community Youth Development

Although the field of Community Development and Youth Development are not new, the merged field of *Community Youth Development* where youth participate to bring about *community change* is indeed very different than youth participation for the sake of *youth development.* Due to the fact that the Community Youth Development framework is relatively new, journal articles and websites are now becoming available. This emerging field holds much promise if funding and research is made available to fill in the gaps between theory and practice.

Influence of Technology on Learning

As technology becomes an integral part of our schools, educators can look to the students — the Net Generation — to help make the shift to more student-centered learning. (Tapscott, 1999) Computers and technology alone is not the answer. The challenge is to learn *how to best use technology* and *the most potent force for change is the students* themselves. Tapscott goes on to identify eight shifts of interactive learning that he has observed in schools across the nation. These eight shifts present real gaps between how many teachers currently teach and how kids ideally learn best. His eight shifts of Interactive Learning include:

- From linear to hypermedia learning — Most textbooks are written to be tackled from beginning to end. Youth today access information more interactively and non-sequentially as they surf channels and multi-task between many different software programs and websites.
- From instruction to construction & discovery — Rather than standing up in front of a group and *teaching* something, educators should design curriculum in partnership with learners or even help learners design the curriculum themselves. Constructivists argue that people learn best by doing, rather than just listening, especially if they can construct knowledge anew, based on their concrete experience with abstract ideas and concepts.
- From teacher-centered to learner centered education — Teachers need to focus on creating the learning environment and providing resources.
- From absorbing material to learning how to navigate and how to learn — This means learning how to synthesize, not just analyze information so youth can construct higher-level structures and mental images.
- From schools to lifelong learning — Learning has become a continuous, lifelong process and really just begins after getting a formal degree or certificate.
- From one-size fits all to customized learning — Digital media could allow every individual to find personal paths to learning based on their backgrounds, talents and learning styles.
- From learning as torture to learning as fun — Using the new media, the learner becomes the entertainer and is motivated, feeling responsible for learning.
- From the teacher as transmitter to the teacher as facilitator — Teachers need to act as consultants to teams of youth, facilitating the learning process by helping youth process the experience, as well as participating as a technical consultant on new media.

Tapscott closes his article by stating, "Give students the tools, and they will be the single most important source of guidance on how to make their schools relevant and effective places to learn." His view indeed complements those of innovative youth development educators who are also advocating strong youth – adult partnerships based on experiential learning experiences. An astute group leader who can construct learning activities as well as help the group process and apply what was learned in a different setting needs to facilitate this new type of learning. Most non-formal educators, like those in Extension, can do this more effectively for they are not burdened by the structure of the formal classroom and the need to implement state mandated education standards, assessment and accountability measures.

Evaluation Gaps

There has been a lot of formative evaluation, describing how to improve programs and curriculum products, but there's never enough good summative evaluation on whether a program or a curriculum has really made a difference. Although the Logic Model appears to hold the most promise, the jury is still out on whether it can truly answer these key questions:

- Did we really make a difference in the lives of people?
- Do the Curriculum products really work and support the intended outcomes?

There has never been a *silver bullet* that has been able to satisfy the unquenchable need to document the difference programs have made. However, at this time in history in the field of 4-H Youth Development, the Logic Model shows the best potential of meeting this need. However, more research needs to be aggregated to show if it truly delivers on its promise.

Summary of Gaps in Best Practices

In summary there is a need for more research on:

- Defining and developing quality boating & fishing curriculum based on national criteria for non-formal community based organizations like 4-H.
- The integration of research and practice to clearly articulating the *best practices* for facilitating youth—adult partnerships for:
  a) Facilitating meaningful experiential learning
  b) Creating a community youth development model for creating change
  c) Interactive learning utilizing technology
- Determining if the Logic model has been able to help programs show that they truly have made a difference in the lives of people.

Recommendations for Future Research

Recommendation #1: Integrating Research and Practice

Researchers need to utilize Youth–Adult Partnerships with youth fully engaged with adults in research related activities to define best practices focused on:

- Implementing youth—adult partnerships in diverse communities.
- Engaging community based youth—adult partnerships in creating their own experiential based curriculum.
- Implementing interactive technology based learning in community organizations.
- Defining strategies for moving from a positive youth development model to a community youth development framework that harnesses the energy, creativity and dedication of both youth and adults to create community change
- Developing an international version of this emerging community youth development framework that could be adaptable around the world.

Each of these five recommendations is an in-depth research proposal of its' own and could require the intensive work of a cadre of researchers for many years to come. However, it is often easier to look around one's environment and begin to try things out on a small scale, working on this in a more holistic and integrative fashion.

One example of this approach is the work this author is currently doing with the Wisconsin Department of Instruction's Digital Divide grant helping rural Wisconsin communities train youth to increase community access to technology. To integrate research and practice, we are proposing to work with existing youth—adult partnerships and use the Logic Model to develop a performance framework to clearly communicate the inputs, outputs and outcomes of this grant, in language that is understood by all partners. We hope to engage youth–adult partnerships in six locations to create their own experiential based curriculum and to implement interactive technology based learning. Our ultimate goal is that this process will help move communities from a positive youth development model to a community youth development focus whose long term outcome is to create intentional sustainable social change that decreases the digital divide in rural communities.

To initiate this process we will be proposing that the evaluation work group of the Digital Divide Steering Committee be comprised of an equal number of youth and adults. They could participate in a one-day workshop where they use the Logic framework to clearly articulate the outcomes of this grant, in common language that can be understood by all stakeholders. This Logic Framework approach could also be used with other potential sites that hope to receive subgrants. Workshops on utilizing youth and adult partnerships to co-create their curriculum would follow, along with ongoing support for sustaining this community youth development model for decreasing the digital divide in six rural communities.

Recommendation #2: Relationship to Youth Environmental Education Movement

Although I am not able to speak to eloquently to the area of boating, fishing and environmental stewardship, I can only assume that the same principles would be relevant to this field. One example of how to approach this could include the following scenario.

- Non-profit organizations like RBFF could work with youth development researchers and practitioners to create a sustainable grassroots movement mobilizing youth and adult partners to conserve and restore our nation's aquatic natural resources by getting involved in boating and fishing. One way they could get started would be to:

- Develop a long term sustainable Youth – Adult Boating and Fishing Stakeholder group comprised of 50% youth and 50% adults that would provide ongoing strategic direction. They could use the logic framework to help determine what is the best way to build these types of youth – adult partnerships on both a national as well as grassroots level.
- Provide youth—adult partnerships with tools to develop a marketing campaign to help middle school youth conserve and restore our nation's aquatic resources through involvement in hands on water, fishing and boating service activities.
- Once these youth—adult partnerships are established, involve them in co-creating experiential based fishing, boating and environmental stewardship curriculum materials that can be customized for use with other local youth—adult partnerships.
- Provide these curriculum materials in both print and interactive technology based options that can be customized for use by end users.
- Use technology to help strengthen and create a sense of community among grassroots organizations and real people with an interest in these topics.

These are but a few ways that these Best Practices of Youth Development could relate to the Recreation Foundation for Boating and Fishing (RBFF). But like any other sustainable community development effort this approach needs to be designed by the real people who are the key stakeholders in the RBFF movement. For often times the process of co-creating movements like this is even more important the ultimate product.

Summary and Comments

While reflecting on the historical evolution of 4-H Youth Development movement or the environmental movement one must remain true to one's core values and learn from the past. In closing, I urge Recreational Boating and Fishing Foundation to continue to utilize marketing and education strategies on their journey to increase public awareness for protecting, conserving and restoring this nations' aquatic natural resources. This lofty goal could lend itself to integrate research and practice by using youth—adult partnerships, experiential learning strategies and the community youth development movement to continue to develop a sustainable learning community that helps bring about lasting change in how communities approach boating, fishing as well as environmental stewardship.

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