

North Florida Chapter of the American Meteorological Society

Strategic Policy Directive
Science & Education Committee

2004-2005 Chapter Year
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Introduction

Welcome to the Science and Education Committee of the North Florida Chapter of the American Meteorological Society! In its second year of existence, the Science and Education Committee aims to expand upon its initial offerings to Tallahassee-area elementary, middle, and high schools to encompass a broader range of schools and activities within the Tallahassee region. Much of the groundwork to ensure future success was set in place last year, yet much remains to be done to develop and put in place effective programs that will entrench the local chapter within the community.

Science and education outreach, as you may know, is the single most important activity that this – or any – local chapter can undertake. Reaching out to the next generation of scientists and the local community in general is not only very rewarding for those we reach but for ourselves as well. Helping to enrich others and see the smiles on their faces and gleam in their eyes in the process provides a feeling that is unparalleled. Our parents always tried to make things better for us than they had it themselves; it should be our duty to do the same for the next generation of young, talented individuals.

Over the coming year, the chapter is primed to expand not only in terms of numbers of members but in terms of people served and programs undertaken. The expansion of the Science and Education Committee and its programs falls squarely in the midst of the overall chapter expansion. Our school programs will be refined through practice and discussion; our Science Fair involvement will increase; and our involvement with the community will increase with the establishment of a K-12 local chapter. We have the manpower, knowledge, and determination to see our goals to fruition; it is now only a matter of setting these goals in motion.

I feel that we have a very productive and rewarding year ahead of ourselves and look forward to helping to lead this chapter and the Science & Education Committee over the coming year. Most importantly, I look forward to work with each of you all interested in the committee. Together, we can all accomplish great things. My mailbox is always open; feel free to contact me if you ever have any questions, comments, or concerns.

Here's to an excellent year!

-Clark Evans
-Chair, Science & Education Committee
-Past President, North Florida Chapter of the AMS

Purpose

The purpose of this document is to outline the current programs, goals, and organization of the Science and Education Committee of the North Florida Local Chapter of the American Meteorological Society (AMS). Additionally, future committee programs and goals are outlined. In total, this document is effectively designed to serve as a manuscript and outline for all current and future committee programs and functions.

The precedent for this document was established in the 2003-2004 chapter year upon the development of a policy directive by Chris Bennett, current chapter President and former chair of the Science and Education Subcommittee. This comprehensive revision to that document is designed to highlight the programs set forth in the previous version and to set forth clear goals for the committee in terms of these programs. In addition, this document is designed to outline the role of the committee within the larger organization of the North Florida Local Chapter of the AMS.

As committee functions and programs are developed and refined, this document will be amended with the new information. It is anticipated that the entire content of this directive will be subject to review on a yearly basis as chapter programs and priorities change over time. However, updates, amendments, and additions are by no means limited to the yearly review process and may be made at any time. The chair of the Science and Education Committee shall have final say over any changes to this document and will oversee the aforementioned yearly directive review.

While every effort has been made to not contradict any information found within the Strategic Policy Directive of the North Florida Local Chapter of the AMS, in the event of any contradiction between the two documents, the Chapter's Strategic Policy Directive shall take precedence over this document and every effort will be made to correct the contradiction.

Mission of the Committee

The overarching mission of the Science and Education Committee is to educate the next generation of young scientists and potential meteorologists about various aspects of the Earth, its atmosphere, and the weather through interactive outreach programs geared towards individual grade levels; to encourage increased involvement in meteorology and the atmospheric sciences through our participation in science fair competitions; and to encourage active discussion and communication between youth interested in the weather through the development and maintenance of a local youth weather club, as designated by a K-12 chapter of the American Meteorological Society.

Committee Designation

The Science and Education Committee is given its authority and general power by the Constitution and Strategic Policy Directive documents of the North Florida Local Chapter of the American Meteorological Society.

The Strategic Policy Directive, issued on a yearly basis by the President of the North Florida Local Chapter, details the committee as follows:

Science/Education Committee – *Chaired by the Science and Education Officer. To judge science fairs, serve as mentors at local schools, coordinate all chapter education policies, etc. The President shall serve as an ex-officio member of this committee.*

The Constitution of the North Florida Local Chapter, a permanent document designed to govern all chapter organization and business, does not currently have a designation for the Science and Education Committee, noting only that additional committees may be established under the direction of the President and the Executive Board. Revision of the constitution to reflect the importance and permanence of the Science and Education Committee is expected early in the current chapter year.

The content contained within this document expands upon the broad definitions established in the Strategic Policy Directive by specifically outlining the board programs of the committee.

Committee Programs

The primary programs of the Science and Education Committee are the school outreach programs to Tallahassee-area elementary, middle, and high schools. These programs, established during the 2003-2004 chapter year, are highlighted first. Additional programs of the Science and Education Committee are the science fair judging and K-12 local chapter initiatives and are highlighted in the subheadings following the local school programs.

Elementary School Program

Within Leon County alone, there are 25 elementary schools servicing the youth of the Tallahassee region. The Leon County Schools Program Monitoring and Evaluation Report for the 2003-2004 school year denotes that between grades K-5, there were 14,464 students attending the 25 elementary schools. The sheer number of students that we can reach through our programs is astounding and further exemplifies how important our program can be to the youth of our service region.

At some point during their science studies at the elementary level, these students are exposed to the weather in terms of clouds, the seasons, and the difference between rain and sun, for example. At home or in extended programs, they become exposed to weathermen on television, severe weather events (such as hurricanes), or get to take part in hands-on activities on field trips or in the classroom. Teachers are very much interested in giving their students these opportunities, yet often do not have enough time to devote a full treatment to the topic. Through past experiences, we have found that teachers are more than willing to have our group make presentations to their students to provide information on what they do not have time to cover.

A program tailored to these grade levels must be interactive to keep the students' attention for approximately forty-five minutes yet on a simple enough level for them to completely understand what we are presenting. The program developed in the 2003-2004 chapter year reflects these remarks and is designed as a basis for future expansion of the elementary school programs.

Currently, the elementary school program highlights the following elements:

- What is the weather, and what does it mean?
- What are the seasons, and why do they occur?

- Discussion of the three basic cloud types, cirrus, cumulus, and stratus.
- Distinction between rain and snow as well as hot and cold.
- Discussion of severe weather:
 - Introduction to hurricanes.
 - Types of severe weather.
 - Questions from students.
- Who are the TV weathermen, what do they do in forecasting, and how computers are important to weather.
- Hands-on Activity: Tornado Tubes.
- General Question & Answer Session, time permitting.

Supporting materials for presentations of this program can come in the form of cloud charts, hurricane tracking maps, and other assorted promotional items. As the elementary school program typically requires more of a hands-on approach than at higher grade levels, the number of committee participants at each function ideally will reflect this fact. A 6:1 to 10:1 ratio of students to committee members is ideal and should be desired for each function.

Middle School Program

The middle school level is the level at which children tend to change the most. Designing a program for these students is inherently difficult owing to the great differences between the knowledge and maturity of students in the sixth grade versus those in the eighth grade. However, over time we have discovered that we should not underestimate how much these students already know or how interested they may be in the weather, clearing up two misconceptions about this group of students.

Since there are three fewer grade levels than at the elementary school level, there are decidedly fewer students that can be reached through our middle school program. Leon County Schools lists 7,393 students in grades 6-8 during the 2003-2004 school year, or about half the number in elementary schools. Similarly, there are only 9 schools within the county that service students in these grade levels, nearly a third of the number of elementary schools. While fewer numbers of students may be reached overall at the middle school level, more students can be reached in one presentation.

Weather studies in middle schools tend to focus on Earth Sciences as a whole as opposed to pure meteorology. An emphasis on "how" and "why" tends to capture the attention of most students better than solely presenting information, as children tend to be most curious at about this time in their lives. Again, teachers have shown an interest in expansion upon what they can cover

in their lesson plans and our middle school program has been designed with this in mind.

The following program was developed by the inaugural committee in 2003-2004 and shall serve as a guideline and basis for future revision and expansion of our efforts. It should be noted that there is some overlap with the elementary school program, with these topics particularly geared at sixth grade students, as well as some overlap with the high school program, with those topics particularly geared towards eighth grade students.

- How does the weather work?
- What are the reasons for the seasons?
- What are the six predominant cloud types?
- What are the four main types of precipitation (rain, snow, sleet, and hail)?
- Severe weather phenomena and the tools we use to forecast & detect it.
- TV Weather & Weather Forecasting, including tools of the trade and an introduction to various governmental groups such as NCEP and the NWS.
- Types of watches and warnings and how they relate to the various types of weather.
- Discussion on weather safety and preparedness.
- Basic current weather discussion, if time permits.
- Hands-on Activity; examples include a sling psychrometer, radiosonde, and weather station equipment.
- General question and answer period, time permitting.

Supporting materials for presentations of this program can come in the form of cloud charts, hurricane tracking maps, severe weather awareness material, and other related handouts and information. Less of a hands-on approach is required for these grade levels than at the elementary level, meaning a lesser ideal ratio of 15:1 students to committee members should suffice for the majority of middle school presentations.

High School Program

By the time students reach the high school level, they oftentimes have a fairly good idea of what interests them and what they would like to pursue for a career. Judging by the relatively low numbers of incoming students into meteorology on a yearly basis, the majority of these students are not strongly considering meteorology as either an interest or a future career. However, there still remain a fairly substantial number of students at least interested in the weather and undecided about a future career after school.

This group of students is primarily the group we are interested in gearing our programs towards amongst the high school population. Obviously, our programs are not limited to just these students; but, designing a program with them in mind is likely to have the greatest impact and benefit to everyone involved. Furthermore, several students who did not even consider meteorology may become interested in the field as a result of our programs, at least as a hobby, making a well-designed program even more of a necessity.

The high school program itself is designed as a short summary of an introductory-level meteorology course that is offered at any university with an undergraduate meteorology program. At Florida State, this is analogous to the MET1010: Introduction to Atmospheres course. It is also designed to serve as a feeder program for those interested into the K-12 local chapter and meteorology club, to be outlined in the following section. Leon County Schools note that in 2003-2004, the 5 high schools in the Tallahassee region served a total of 9,180 students. Thus, the potential is there to reach quite a few students in a relatively short period of time with an effectively designed program.

Our high school program, initially developed in 2003-2004, is designed to do just that. It is at a higher level than any of the other two programs and requires a fair amount of sophistication and weather knowledge to present properly to the students. The program that follows is intended to serve as a basis for current programs and a guide for future expansion of our efforts.

- Survey of meteorology, including a basic overview of the field with, for example, ideas on wind and circulation.
- What are the layers of the atmosphere? This includes the surface boundary layer, why the sky is blue, as well as interesting detail about the Tallahassee weather station and how the sandy soil it sits over affects readings.
- Debunking common meteorological myths and misconceptions.
- Discussion of lightning, including common types and why central Florida is termed the lightning capital of the world.
- Discussion of the development of hurricanes; includes information on recent memorable hurricanes.
- Highlights of global warming and global climate change phenomena, including the ozone hole and El Niño/La Niña.
- What are the various watches and warnings and how do they relate to various types of weather?
- Severe weather preparedness and safety.
- Recruitment & how weather plays a big role in society. Includes a discussion of what jobs are available in the field.
- General question and answer session, time permitting.

Large numbers of presenters are not required and a student to committee member ratio of 25:1 may be feasible for this group. Similar pamphlets and handouts to the elementary and middle school students, however, remain useful for this age group.

K-12 Local Chapter Program

Throughout all grade levels (K-12), a total of 31,037 students can be reached by our programs. This figure is in just Leon County alone; if you expand out to adjacent regions, the number increases even further. If just 0.1% of those students are interested in the weather, that brings about 31 students who could potentially form the basis for a K-12 local chapter or, more appropriately, a Tallahassee weather club. The potential is there for such an initiative to become even more popular than the overall North Florida Local Chapter based upon attendance and interest alone.

A local weather club would likely be geared towards the younger and older students, particularly those around third grade and those close to entering college; these groups tend to comprise those most interested in the weather as well as the groups for which further interaction and presentations would be most beneficial. However, although flexible based upon actual membership, early activities should be designed with all ages in mind. Input from local teachers and administrators, as well as the EXPLORES! outreach initiative within the Florida State University Department of Meteorology, should be gathered to develop and refine these programs.

Weather club events shall be designed on a frequent basis to extend upon the lessons presented in the various school outreach programs. Essentially, the weather club should be just that – a club – more so than a meeting group to see continued lessons about the weather; both education and social activities should thus be emphasized in conjunction with each other in planning these events. Efforts should be made to coordinate with local agencies, including local television stations, various governmental groups such as the National Weather Service Office, the Florida State University Department of Meteorology, and science groups within the Tallahassee region (for example, the Challenger Learning Center and the Museum of Arts and Sciences), to design relevant field trips. Examples include a tour of a local weather station, hands-on activities at the learning center, and demonstrations arranged by the groups on FSU's campus.

Ideally, one teacher or administrator will serve as a mentor to the students involved in the club, while the overall infrastructure of the group would

primarily be developed by the Science and Education Committee and the North Florida Local Chapter as a whole. With time, the weather club will become more and more autonomous from the local chapter, although interaction between the two entities should always be welcomed and encouraged. For instance, members of the local weather club would be welcome to attend North Florida Chapter meetings and could be eligible for reduced chapter dues. The extent of the involvement between the two chapters is something that should be evaluated on a consistent basis.

The internal infrastructure of the weather club must allow for the mentor (or, in the lack of a mentor, an elected representative) to hold an active seat on the Science and Education committee and have input towards all chapter outreach functions, including those beyond the weather club/K-12 chapter. This mentor shall serve as a focal point for all weather club activities and benefit from consistent support from the local chapter in planning and running these endeavors. Membership in the local weather club shall be free, with the only costs potentially coming with any club field trips. Meetings shall be held in a central location for all club members, as to be determined at a later date, and can rotate based upon club events.

This document is not intended to be an end-all listing for what the K-12 local chapter is or will be, nor is it intended to limit how it is formed or how it grows. Input will be actively solicited from local teachers as well as chapter members and meteorology professionals into how best to design the club and this section will be updated as needed to reflect this fact. Albeit a new initiative of the chapter and the Science and Education Committee with much still to be determined, developing such a club/chapter is one of the most important activities we can undertake in the coming year.

Science Fair Program

Starting with the Riley Elementary School Science Fair in April 2004, the North Florida Local Chapter and the Science and Education Committee actively participate as judges for and, where requested, sponsor awards and support to local area science fairs, particularly on the elementary school level. With initial development of the science fair program completed, we look to expand upon this program by servicing additional schools' science fairs in the coming year. Over time, the potential exists for the committee (or future K-12 chapter) to hold its own science fair or competition, solely highlighting projects in the atmospheric sciences.

In judging these science fairs, a large number of judges are required. This makes active participation from the committee and chapter as a whole crucial to

effectively judging projects. Using the Riley Elementary Science Fair as an example, in a three-hour span, five judges were tasked to judge 100 projects in total with an attempt made to have at least three judges judge each project. Despite very much enjoying the opportunity to judge the projects and become involved with the students' work, the judges found that the sheer numbers made the task a daunting one. Thus, at least ten judges should be sought for each science fair program.

A rubric to judging each science fair project was developed by Chris Bennett in the 2003-2004 chapter year and used in practice to judge projects at the Riley Elementary Science Fair. It shall serve as the guideline metric again for the coming year, albeit with modifications depending upon the academic level for which it is being used. Documents provided by a school for its science fair, however, shall take precedence over our rubric. The emphasis on judging projects shall be to reward those that perform an experiment and follow the scientific method over those that are merely reports, as highlighted in the sample rubric below.

GUIDELINES FOR JUDGING SCIENCE FAIR PROJECTS

Sample Rubric

PROJECT # _____

1. SCIENTIFIC METHOD (ALL must be visible on the backboard) _____/15

- _____ 1. **Purpose:** Is a **MEASURABLE** question asked?
- _____ 2. Is a **hypothesis** (educated guess) formed to answer the purpose? (4 Points)
- _____ 3. Are **both variables** (manipulated/changed and responding/measured) identified?
- _____ 4. Are the **controls** (what was kept the same for each trial) identified?
- _____ 5. Does the **procedure** used test the hypothesis in a MEASURABLE manner? (4 Points)
- _____ 6. Are all the **materials** listed?
- _____ 7. Have the **observations** been analyzed (totaled or averaged) and displayed with a **graph**, and the **variables** (what was changed, then what was measured) labeled on the graph?
- _____ 8. Has a **conclusion** been drawn based on the observations? Does it **explain WHY** this happened? (2 points)

2. DISPLAY AND WRITTEN WORK (4 out of 5 required) _____/5

- _____ 1. Are the steps of the scientific method presented in a **logical sequence**? (2 points)
- _____ 2. Is **written material** clear, neatly written, and large/dark enough to be read from a distance?
- _____ 3. Does it show attention to grammar and spelling appropriate for student's age?
- _____ 4. Are the **references/acknowledgements** noted on the backboard?

3. ORAL PRESENTATION (4 out of 5 required) _____/5

- _____ 1. Can the student adequately **explain** the project using the observations as a guide?
- _____ 2. Can the student verbalize **what was learned** from the project? Can they explain WHY they got the results and conclusion that they got?
- _____ 3. Can the student answer **specific questions** about the project?
- _____ 4. Did the **student** plan and carry out the project (with appropriate parental guidance)?
- _____ 5. Did the **student** produce the backboard display (with appropriate parental guidance)?

4. APPEARANCE AND CREATIVITY (4 out of 5 required) _____/5

- _____ 1. Is the display **visually appealing**? Is it fun and interesting to look at?
- _____ 2. Is the student's work **presented neatly** and with pride and attention to detail?
- _____ 3. Is the project presented on a **self-standing** poster or backboard?
- _____ 4. Has the student addressed the question in a **creative and original** way?
- _____ 5. In addition to the graph, have observations been displayed with **charts, diagrams, or pictures**?

JUDGE'S FINAL SCORING: /30

4 of 4 categories, approx. 25-30 points	BLUE	(First Tier)
3 of 4 categories, approx. 20-25 points	RED	(Second Tier)
2 of 4 categories, approx. 15-20 points	GOLD	(Third Tier)
1 of 4 categories, approx. 0-15 points	WHITE	(Fourth Tier)

Additional Comments:

In the above rubric, each question counts for one point unless otherwise noted. To be considered for top overall prizes, the requirements noted with each category title – i.e. “4 out of 5 required” – must be met for all categories. This is primarily to reward projects that are strong in all aspects of presentation, research, and experimentation over those that are substantially lacking in one or more areas. Final scoring categories are meant to provide a basis for what tier a particular judge feels a project should be placed relative to all projects; excellent projects will end up in the first tier, while less impressive ones will fall in the third and fourth tiers. The point values are meant as guides and not firm limits.

Judging of projects is not limited to just meteorological or atmospheric science projects, though these may be highlighted, where appropriate, for separate consideration for an award from the local chapter. Results from each science fair competition shall be maintained in committee records for a period of three years, the same as for all other chapter documents, as well as submitted on a regular basis to the national American Meteorological Society. Certificates, if desired, are freely available from the national AMS with advanced notification.

Current Chapter Year Goals

To be developed and refined with the assistance of the Science & Education Committee and the Executive Board of the North Florida Local Chapter of the AMS.

Long-Term Committee Goals

To be developed and refined with the assistance of the Science & Education Committee and the Executive Board of the North Florida Local Chapter of the AMS.

Closing

This document was initially developed on 3 July 2004 by Clark Evans, chair of the Science & Education Committee. This guiding document of the Science and Education Committee of the North Florida Local Chapter of the American Meteorological Society is copyright © 2004, North Florida Local Chapter of the AMS. All rights reserved.

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