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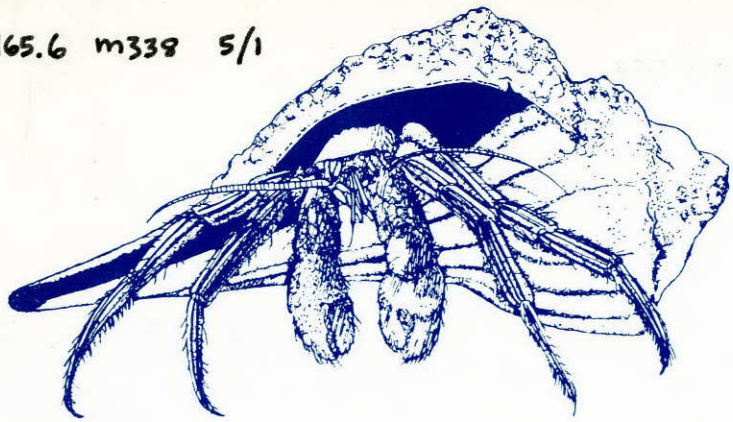

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# Marine Education

A COOPERATIVE EFFORT OF THE TEXAS A&M UNIVERSITY SEA GRANT COLLEGE PROGRAM AND DEPARTMENT OF EDUCATIONAL CURRICULUM AND INSTRUCTION

## School bells herald educational reform

**by Amy Broussard**

As school bells began to ring across Texas this month, students, teachers, administrators and the general public were still assessing the impact of the long-awaited and much discussed educational reform. The curriculum changes mandated by the Legislature in 1981, now referred to as Chapter 75, go into effect this year. These changes are substantial by themselves, but Texas' educational system also must implement measures enacted in last June's special legislative session.

The new law, generally referred to as House Bill 72, was a direct result of the work of the Select Committee on Public Education, appointed by Texas Governor Mark White and chaired by Dallas businessman H. Ross Perot. Both the resulting bill and the Committee's report have been interpreted by many as a "get tough" education policy that is intended to upgrade the quality of Texas' public schools.

Although Chapter 75 and House Bill 72 cover separate aspects of the educational system, they must be considered together to fully assess their impact. Basically, Chapter 75 identifies 12 broad subject areas that must be taught at some point in the kindergarten through grade 12 curricula, specifies in great detail what must be taught in each course, and revises graduation requirements. As a result, Texas now has a basic curriculum that must be provided by all 1,089 school districts, regardless of their size, community interests or available resources.

There is no question that a revision was needed. The previous Texas Education Code essentially was a patchwork of 20 separate laws covering such subjects as penmanship and orthography (spelling), but omitting such major subject areas as science. Elementary classes had no guidelines on the amount of time that should be devoted to various subjects, leaving this to the teacher's discretion or particular interest. Under Chapter 75, specific time allocations have been made for each elementary course according to grade level. For example, in grades four through six, a minimum of 90 minutes per day will be devoted to English language arts, 60 minutes to

*(See Education, page 7)*

## Circle March 2 on '85 calendar for sixth annual Symposium

Science, social studies, literature and music headline the sixth annual Marine Education Symposium set for Saturday, March 2, 1985, at Texas A&M University. Plans are underway now for a full day of presentations and other activities.

The Symposium, sponsored by the Sea Grant College Program at Texas A&M in cooperation with the Department of Educational Curriculum and Instruction, is open to all Texas high school students and teachers. Nearly 1,300 students and adults attended last year.

Personal invitations, advance programs and registration forms will be mailed in early December to every teacher who has attended with students in the past five years. Registration packets also will be sent to science and social studies coordinators at each high school in Education Service Center regions 3, 4, 5, 6, 7, 12 and 13, as well as those in all coastal counties and in the Dallas-Fort Worth metroplex. Attendance is not limited to these schools, however; anyone is welcome.

As in previous years, there will be three sessions on scientific research and on more general topics from 9:15 a.m. until noon, followed by field trips and workshops in the afternoon. Exhibits representing various Texas A&M departments and coastal organizations will be displayed throughout the day, and general campus tours will be available for those wanting to learn more about the University.

There will be very few changes in the Symposium format, according to coordinator Amy Broussard, other than staggering the starting times for field trips and workshops to accommodate more students.

"We are specifying that the program is intended for students in grades 9 through 12," Broussard said, "with younger students accepted only on specific recommendation from their teacher. We also will ask students to participate in some follow-up activities to ensure that those registered actually attend the sessions."

**March**

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The pre-registration deadline is February 1, 1985, and the cost is $2.00 per student or accompanying adult. All registrations will be on a first-come, first-served basis, and the registration fee is non-refundable.

Further information on the Symposium is available by writing Marine Education Symposium, Sea Grant College Program, Texas A&M University, College Station, TX 77843-4115.

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# Drifting ice stations further research

by Charles Smith*

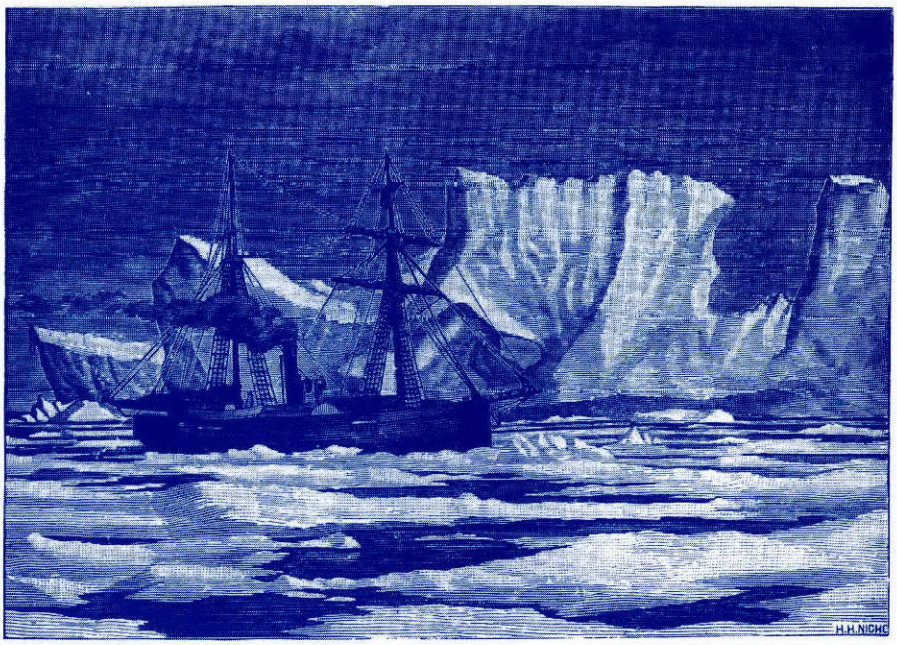
The Arctic Ocean, the smallest of the world's oceans, is a unique region. Almost completely isolated from other oceans, it is connected to the Pacific by the narrow Bering Strait between Alaska and Siberia, and to the Atlantic via the much wider Greenland Sea between Greenland and Europe.

Because of its isolated position and the cold environment, the Arctic was one of the last oceans to be explored. Exploration continues today, primarily from scientific stations located on the ice that covers much of the ocean. Both the United States and the Soviet Union have set up these ice stations.

Although inaccessibility is a factor, the cold remains the major inhibitor to Arctic exploration. Temperatures of -70°F have been reported, and temperatures seldom rise above 32°F. This temperature range results in widespread frozen sea water, which forms what is called **pack ice**. About 75 percent of the ocean is covered by ice year-round, and about 90 percent is pack ice in winter.

Pack ice is not a solid mass. Winds and ocean currents keep it moving, creating areas of open water, or leads, between pieces of ice of various sizes. These pieces of ice are **ice floes**. Pressure ridges up to 33 feet high also are created by pressure within the pack ice. Floes are constantly breaking and being created.

Pieces of ice up to 200 feet thick that break free from a glacial ice shelf at Ellesmere Island (Figure 1) are called ice islands. These islands may survive for decades because of their size, and often are covered by silt, dirt and boulders and may have small hills.



*Dr. Charles Smith is a research scientist for the Center for Strategic Technology, Texas A&M University.*

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***Marine Education*** is to inform elementary and secondary teachers about current research and activities in the marine environment. *Amy Broussard*, editor; *Bonnie Blackburn*, marine education coordinator.

## Early exploration

Until the early 1900's, exploration of the Arctic Ocean was hindered by the lack of a vehicle that could travel across ice, open water and pressure ridges. This not only affected movement of explorers, but also transport of the food, supplies and equipment needed to sustain life in the hostile environment.

Several early attempts to explore the Arctic were conducted aboard ships. In 1879, U.S. Navy Lt. George DeLong sailed his ship JEANNETTE into the Arctic where it was soon trapped in pack ice. After being locked in the ice in 1881, the JEANNETTE was crushed and sunk by pack ice north of Siberia. Parts of the ship were discovered three years later off the coast of Greenland.

Ten years later Fridtjof Nansen specifically designed a ship to withstand the pressure of Arctic pack ice. Christened the FRAM, the ship entered the Arctic from the Pacific in September 1894 and was soon frozen into the ice. The FRAM slowly drifted directly across the Arctic, indicating that a major ocean current flows from the Pacific across the Arctic to the Atlantic Ocean. The FRAM was released from the ice in 1896.

Another ship, the MAUD, was deliberately frozen into the Arctic ice in 1922. It began its drift north of the Pacific Ocean near the point where the JEANNETTE began. The MAUD reached farther north than any previous ship in its two-year drift, but apparently did not reach the North Pole.

An event in 1934 contributed to the evolution of one of the primary means of exploring the Arctic Ocean. A Soviet passenger ship, CHELYUSKIN, was trapped in pack ice north of the USSR in late 1933. Early in 1934, the ship was crushed like the JEANNETTE and sank. Fortunately, the 103 passengers and crew members were able to leave the ship and establish a camp on the adjacent ice. Supplies were airlifted to the camp, and in April 1934 the camp was evacuated by aircraft. This proved the value of aircraft to Arctic exploration.

## Drifting ice stations

Airplanes can transport huts, buildings, food, equipment and other items needed to set up scientific stations on ice floes, and, even more importantly, resupply the stations or evacuate individuals or entire crews in emergencies. The airplane accelerated exploration of the Arctic. Ice floes and ice islands are excellent bases from which to study the Arctic, but they do present several hazards, such as sudden fracturing of the floes, pressure ridges and an inability to control the path of

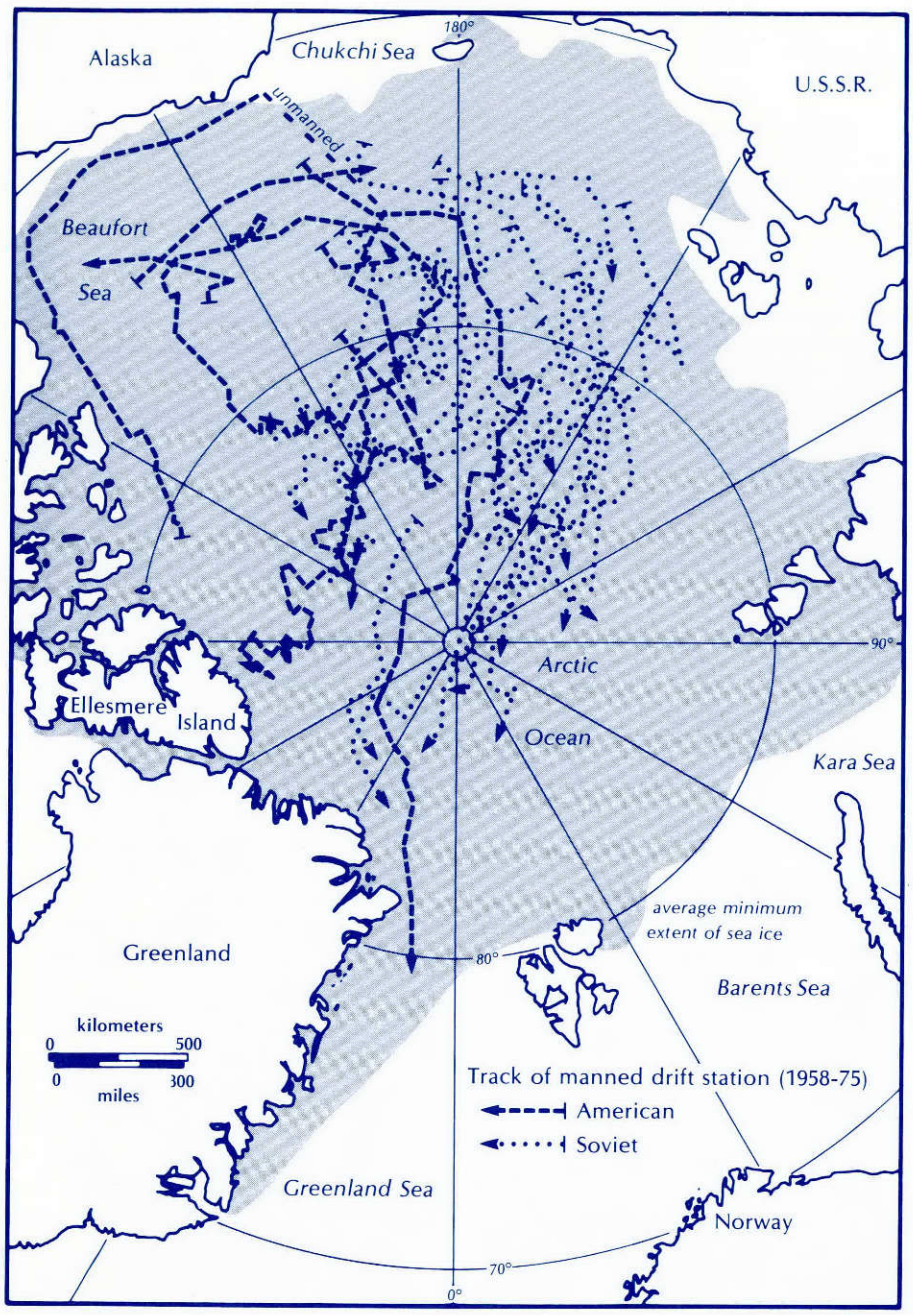


*Figure 1. American and Soviet drifting ice stations*

the floe or island. By carving out landing strips on the ice, scientists can conduct their research while being assured that they can be evacuated quickly should an emergency develop.

The first station, named the North Pole, was established on an ice floe in 1937 when a four-engine Soviet aircraft transported 9 tons of supplies and four men onto the ice. The ice floe drifted out of the Arctic and began to break up off the coast of Greenland after 274 days, and the crew was evacuated by an ice breaker.

Exploration was halted by World War II, but the USSR established another station on the ice in March 1950. This station was designated North Pole-2 and the earlier station was renamed North Pole-1. While North Pole-2 was still occupied, the United States set up its first scientific station, Polar Ice Pack Station, in 1951. The U.S. station was set up in February, but had to be evacuated a month later when the ice floe split and one half was driven over the other. North Pole-2 was evacuated a month later, in April 1951.

Both American and Soviet pilots had observed several ice islands. Americans designated three of these as T-1, T-2 and T-3. In March 1953, the U.S. Air Force established a station on T-3, a large, kidney-shaped island (Figure 2). The environment was far from welcoming; the temperature at the time of landing was -60°F. This ice island was occupied on at least four occasions in the 1950's and 1960's.

In April 1954, the Soviet Union set up two new drifting ice stations in the Arctic and decided to have two in operation at all times. In early 1983, North Pole-26 was being established while North Pole-25 was still in operation.

### Ocean floor research

The U.S. and Soviet ice stations are used for both scientific and strategic purposes, but it is the former pursuit that has evoked the most cooperation between the two countries. Much of the scientific data have concentrated on the nature of the ocean floor, as scientists have tried to prove or disprove earlier suppositions.

Scientists originally believed that the Arctic Ocean was shallow, but depth soundings taken from the FRAM had disproved this. These early soundings had extended down 6,000 feet without reaching the bottom.

Several significant features of the Arctic ocean floor have been discovered at the drifting ice stations. A major feature is the Lomonosov Ridge, which extends across the Arctic Basin for 1,118 miles—from Siberia to Ellesmere Island. The ridge reaches to within 2,472 feet of

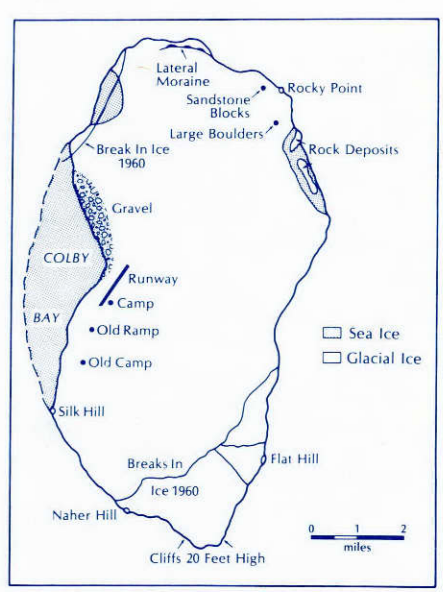


*Figure 2. Ice Island T-3 (Bravo)*

# U.S., Soviet data discount old theories

the ocean surface and divides the ocean floor into two major basins. The Amerasia Basin, with a depth of 13,000 feet below sea level, is on the Pacific side. To the Atlantic side of the ridge is the Eurasia Basin, with a depth of 11,000 feet. The Lomonosov Ridge varies from 27 to 124 miles wide and apparently is volcanically active. The Soviets' North Pole-3 station experienced strong shocks and the floe cracked in November 1954 near the Lomonosov Ridge. One crew member walked to the edge of the flow to observe the volcanic eruption, was overcome by sulfuric gases and died. Crew members at North Pole-8 observed another active submarine volcano in August 1960.

The Alpha Cordillera, another ridge originally called the Mendeleyev Ridge by the Soviets, was discovered by North Pole-4 researchers in 1955. This structure, which lies in the Amerasia Basin, was the location of sea floor spreading in the past and also crosses the Arctic Basin. It reaches to within 3,739 feet of the surface. An extension of the mid-Atlantic Ridge also has been found. Named the Nansen Cordillera, it lies across the Eurasia Basin.

Scientists at the drifting ice stations now know that ocean currents are the primary influence on ice drift. Ocean currents are complex, but generally water from the area of western Siberia and northern European zones travels westward along the coast to enter the Greenland Sea. Water from the Bering Strait area and extreme eastern Siberia does not follow the coast; it crosses the Arctic Basin, passing near the North Pole and exiting via the Greenland Sea. The ocean currents adjacent to the Alaskan and Canadian zone form a closed circle, the Pacific Gyral. The currents in this zone move clockwise with ice taking about 10 years to complete the circle near the outer edge.

In 1937 North Pole-1 scientists disproved an old theory that a permanent high pressure cell exists over the Arctic Ocean. Researchers discovered a low pressure cell during summer that generally is accompanied by unstable weather. Temperatures obtained by the Soviets averaged about 25°F above those for the same dates for corresponding latitudes in Siberia. American stations observed both the highest and lowest temperatures, +43°F and -70°F.

Aircraft development has enhanced Arctic exploration by allowing scientists to make maximum use of ice floes and ice islands. The varied paths of these drifting stations have enabled both American and Soviet scientists to conduct research that has led to significant discoveries about the nature of the ocean floor. One of the most important early findings was that the floor was not a simple, flat basin as originally thought.

Data from these stations have also provided valuable information on the entrance into the ocean from the Pacific. This, in turn, was used by the U.S. submarines NAUTILUS and SHATE when they first entered the Arctic in 1958.

Soviet and American data have provided great insight into meteorological effects as well, not only that in the Arctic Ocean itself, but also that of the effects of the Arctic on adjacent land masses.

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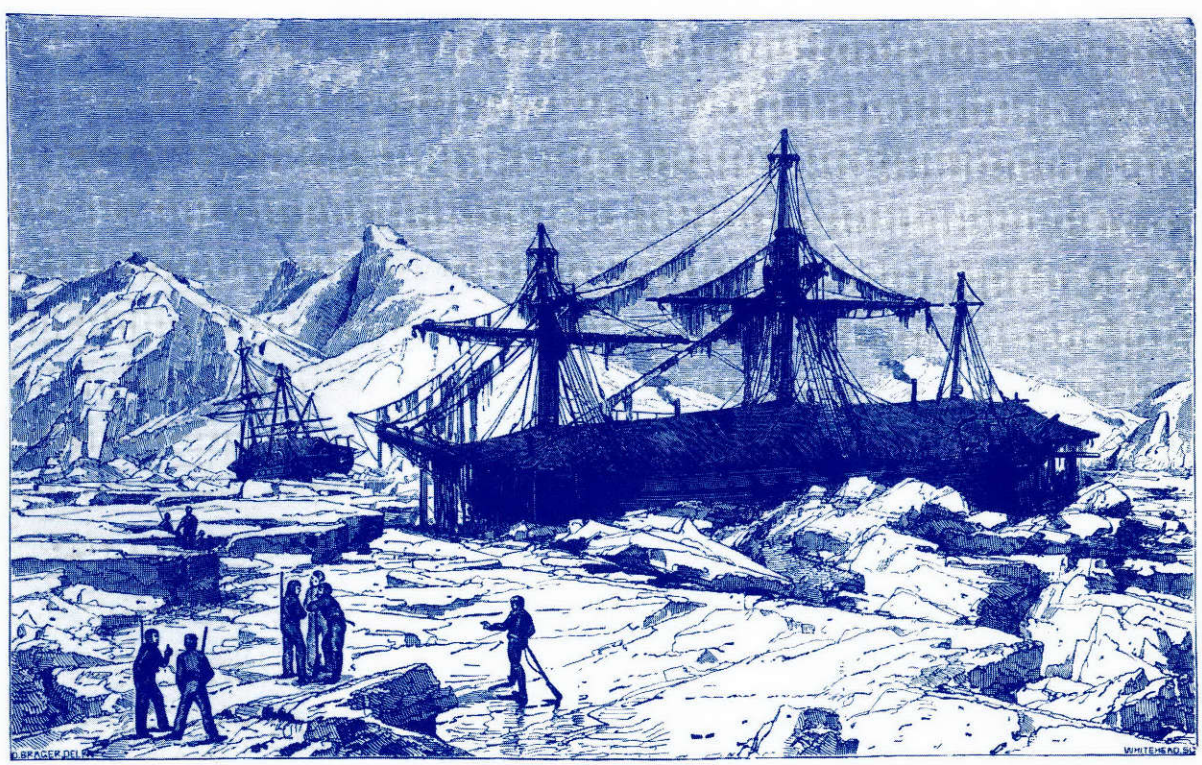

*Marine Facts*

# Hydrolab helps aquanauts explore sea

**Andre M. Landry, Jr.***

Man's ever increasing interest in the oceans and his growing need to live and work underwater has resulted in the development of underwater support platforms. These support platforms are common in commercial diving and are becoming increasingly valuable for underwater research purposes. Underwater support platforms enable the diver to make observations and conduct experiments over long periods of time, permit unlimited access to the marine environment and provide a refuge for rest and refurbishment. Typical platforms include manned habitats, diving bells and submersibles.

The advent of underwater support platforms coincided with technological advances in diving techniques, especially those related to saturation diving. Saturation denotes the state in which a diver's tissues have absorbed all the gases they can hold at a particular depth. Once a diver has "saturated," the amount of time required to rid his body of these excess gases does not increase even if he spends additional time at the saturation depth. Under saturation conditions the diver works out of a pressurized support platform whose atmosphere is maintained at approximately the same pressure as that of the surrounding water or working depth.

A pressurized platform placed on the seafloor that provides support, comfort and a base of operation for the diver and his equipment is called a habitat. Over 60 underwater habitats have been constructed throughout the world since 1960. These structures have ranged from relatively simple shelters providing a day-long work capacity for two divers to very large, sophisticated systems designed for extended seafloor habitation by four or more scientists.

The United States operates the world's only scientific saturation diving habitat. This facility, known as Hydrolab, is located in 51 feet of water in the Salt River Submarine Canyon on St. Croix, United States Virgin Islands. The Hydrolab habitat

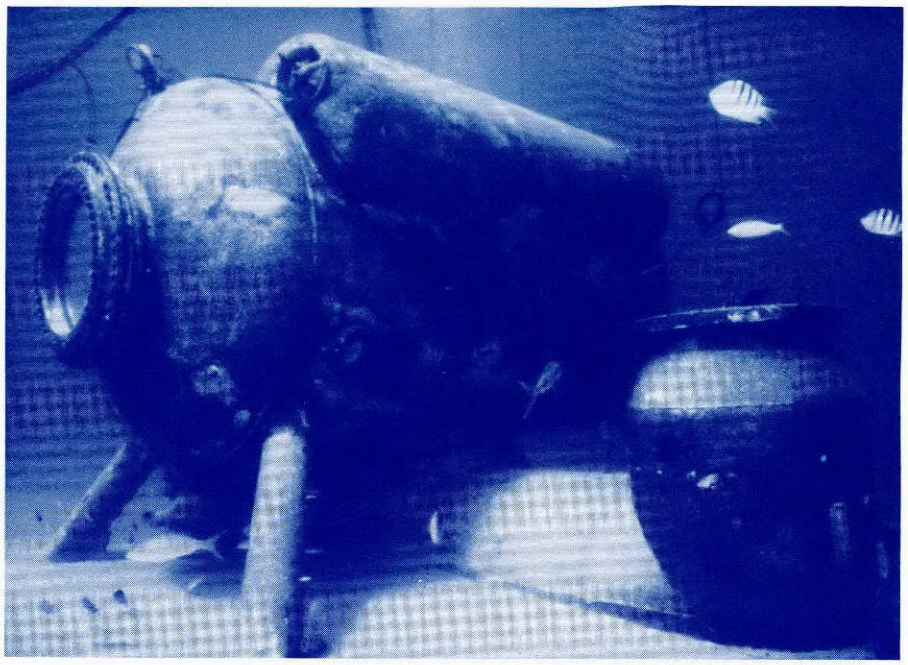

*Figure 1. The Hydrolab habitat located in Salt River Submarine Canyon off St. Croix.*

is operated for NOAA's National Undersea Research Program by the West Indies Laboratory, Fairleigh Dickinson University. Hydrolab was designed and constructed in 1966 by Perry Submarine Builders. Initially, Hydrolab was used as an educational facility by Florida Atlantic University, and later was moved to Freeport, Grand Bahama Island, for scientific operations. Following its distinguished service in Freeport, Hydrolab was purchased by NOAA, refurbished and moved to St. Croix for use in NOAA's Underwater Laboratory System.

Hydrolab is a 16- x 8-foot cylindrical chamber supported on four short legs, positioned three feet above a concrete base (Fig. 1). Entry into the habitat is through a 4- x 2.5-foot trunk located at one end. The single-room chamber is furnished with three bunks, a sink, trash compactor, hot plate for cooking, air conditioner/heater, freshwater shower, communications, normal and emergency lights, and life support and decompression equipment (Fig. 2). There are seven viewports, one of which is three feet in diameter and located at one end of the habitat.

A self-contained, unattended life-support barge floats at the surface above Hydrolab to supply all life support, including electricity, air and water, via an umbilical.

By utilizing Hydrolab and saturation diving techniques, a team of four aquanauts/scientists are able to spend up to two weeks living beneath the sea, studying the ocean floor and its inhabitants. The unique advantage of saturation diving from the Hydrolab habitat is the dramatic increase in underwater working time. For example, a diver working from the surface is limited to 100 minutes at 50 feet in his initial dive while a Hydrolab aquanaut can work as long as he likes at this depth without prolonged decompression. At 95 feet a surface diver is limited to 25 minutes while a Hydrolab aquanaut may spend up to 6 hours making in situ observations, doing experimental manipulations and collecting data.

The current Hydrolab program has supported underwater research critical to the understanding, preservation and management of U.S. coastal resources since 1978. Priority has been given to five research areas during the conduct of scientific research missions in Hydrolab. These research areas include: (1) primary production and nutrient cycling (photosynthesis, movement of nitrogen and phosphorus through aquatic ecosystems); (2) fisheries (physiol-

*Dr. Landry is head of the Department of Marine Biology, Texas A&M University at Galveston.*

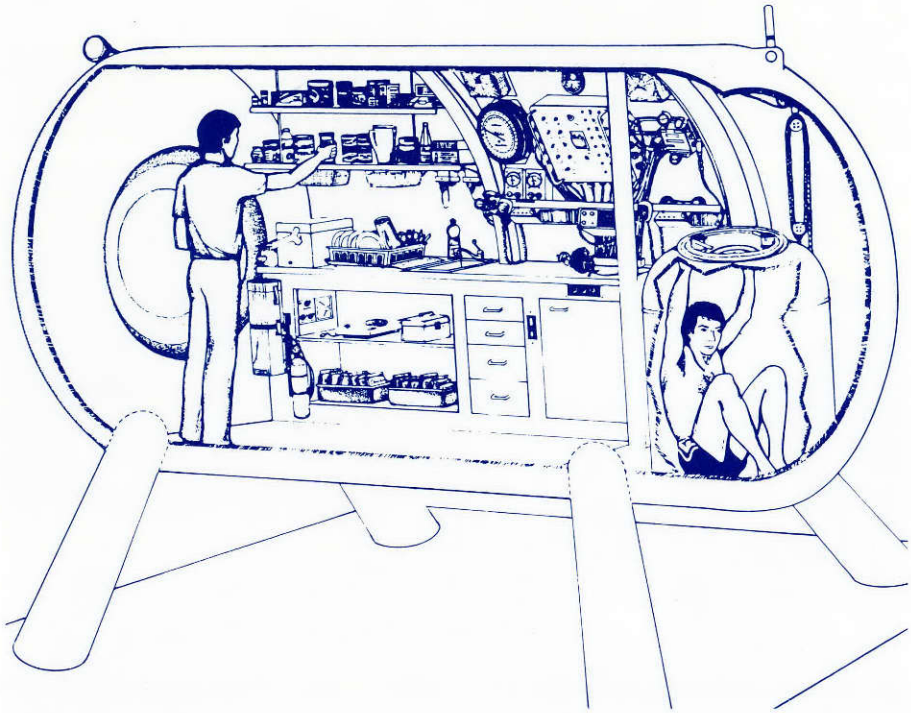

*Figure 2. Artist's pictorial cutaway of Hydrolab.*

ogy, harvesting impact, gear evaluation); (3) marine pollution (ocean dumping sites, responses of organisms to pollutants, bioaccumulation); (4) sea floor properties and processes (sediment transport, mineral resources); and (5) ocean services (diving medicine, instrument performance, archaeology, marine sanctuary monitoring).

Twelve to fifteen scientific missions are conducted out of Hydrolab each year. To date, 165 aquanauts from 71 U.S. institutions and eight foreign countries have conducted scientific missions in Hydrolab. These missions have included 9,110 man-hours underwater and 44,592 saturation hours.

Recently, The Texas A&M University System scientists have been among those chosen as aquanauts in the Hydrolab program. The author teamed with three fisheries gear specialists from the National Marine Fisheries Service in Pascagoula, Miss., and the NOAA Diving Office in Washington, D.C., to conduct missions evaluating the effectiveness of fish attraction devices (FADs) in attracting harvestable concentrations of fish.

These aquanauts tested four FAD designs (Fig. 3) to determine the attractive differences of the various designs; the composition and abundance of species attracted to each FAD design; behavioral patterns of these species; and recruitment time and daily variation in abundance of attracted species. Results of these studies indicate FADs are very effective in attracting pelagic (deepwater) species such as mackerel, tuna and jacks, as well as reef-dependent snapper and barracuda.

Successful missions, such as those conducted by Texas A&M scientists, are made possible by the advantages offered by the unique setting and operational characteristics of Hydrolab. Extended underwater observation time afforded by Hydrolab enables aquanauts to make accurate interpretations of recruitment dynamics and behavioral characteristics of fishes attracted to FADs. The well-developed coral reefs surrounding the habitat provide large numbers of species and individuals upon which to test the effectiveness of FADs. Excellent visibility (often in excess of 200 feet), which is typical of Caribbean waters of the Salt River Canyon, greatly improves the aquanauts' ability to observe the effect of FADs on fishes.

Manned underwater habitats such as Hydrolab have helped marine researchers pioneer investigations into the wonders of the sea. Plans for larger, more complex habitats are currently underway. These habitats of the future will allow scientists to saturate deeper, explore areas previously inaccessible and extend classical land-based laboratory methods and capabilities to the seafloor.

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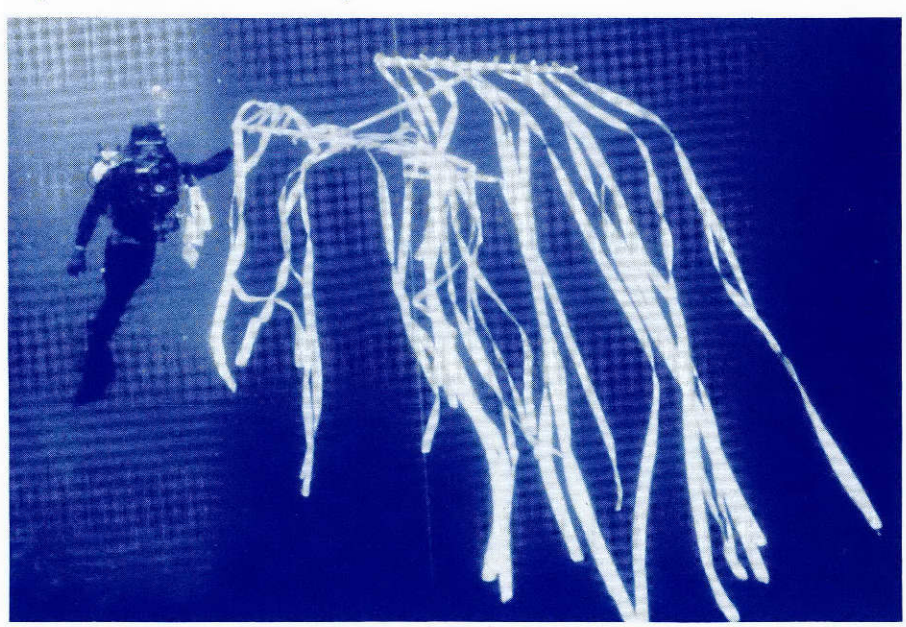


*Figure 3. A fish attracting device (FAD) is deployed near Hydrolab.*

# Education reform

(Continued from page 1)

mathematics and 45 minutes per day each to science and social studies. All elementary grades also must have structured physical education classes, as well as fine arts, health and, if possible, foreign language instruction.

"Basic" education according to Chapter 75 also includes computer classes in junior high and high school, two separate four-year sets of English classes in high school, and imposition of a grade of 70 as the minimum passing grade across the state. On the high school level particularly, Chapter 75 requires that more classes be taught and that students take more academic courses to graduate.

This year's freshmen will need 21 credits to graduate, including four credits in English, three in math, two and a half in social studies, two in science, one and a half in physical education, a half (or one semester) each in health and economics, and seven in electives. Students who choose to pursue the advanced academic program will have only three credits for electives after adding one more credit in science, one each in computer science and fine arts, and two in a foreign language. Vocational students will take job-related courses in lieu of other electives.

While some school districts are scrutinizing their course offerings and trying to decide how they can comply with the state-mandated basic curriculum, others have raised graduation requirements even further.

The College Station Independent School District, for example, requires 22 credits for graduation regardless of the program pursued. Advanced students must have a fourth credit in either math or science, and all others not involved in vocational training must have a third credit in science and one in computer science.

Less than a month after the book detailing the state's new rules for curriculum was distributed by the Texas Education Agency, the Legislature met in special session to mandate even more student-related regulations, as well as to deal with the problem of school finance, statewide educational administration, and teacher qualifications and pay. Many of their changes must be implemented this school year, while others will

be forthcoming over the next two years.

In terms of academic programs, the primary effects of House Bill 72 can be grouped according to those involving prekindergarten, kindergarten and elementary students, testing, grading, compulsory attendance, extracurricular activities, and discipline management.

**Prekindergarten and elementary**

Beginning next year, a school district must offer half-day prekindergarten classes if there are 15 or more eligible children who are unable to speak English or who come from an impoverished family. Participation is voluntary for qualifying students. By the same time, kindergarten through second grade classes are limited to 22 students to encourage more individualized instruction. This size limitation will extend through the fourth grade by the 1988-1989 academic year.

**Testing**

No later than next year, the State Board of Education will begin administering an "exit-level" test in mathematics and English for juniors and seniors. A student must pass this test before receiving a high school diploma, although he or she can retake any sections failed for up to three years. Initially, the test will be given to juniors and then re-administered to seniors who fail any or all sections.

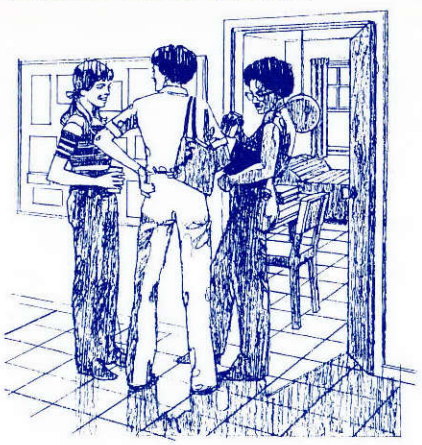
The bill specifically omitted any reference to an "attendance certificate" awarded in lieu of a diploma in the belief that this would be considered discriminatory, but at least two school districts in the state are discussing such a possibility.

Basic skills tests also must be adopted for first, seventh and 12th graders to supplement those now administered for third, fifth and ninth graders. Students failing to achieve a pre-determined level on any basic skills tests will be required to complete a remedial program.

In another area related to testing, students no longer can be exempt from final examinations.

**Grading System**

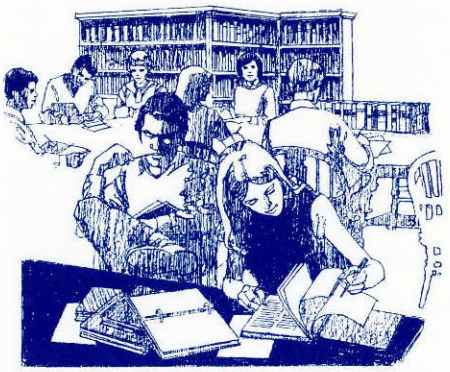
Although Chapter 75 established a minimum passing grade of 70, House Bill 72 extended this by saying that social promotions are prohibited, and no student can advance to the next grade or receive course credit without at least a grade average of 70. At the same time, however, the Bill says the State Board of Education will adopt rules prescribing alternatives to social promotion for students who are consistently unable to be promoted because of poor academic achievement. It also says an individual district may provide for such students in accordance with board rules, provided that parents participate in the deliberations. There has been no clarification of these alternatives thus far.



All schools must use a six-week grading system, beginning this year, and a grade of 70 or less in any subject requires a subsequent parent-teacher conference. School districts also must provide tutorial services, and a student with a grade lower than 70 may be required to attend tutorials at least twice a week.

**Compulsory Attendance**

Students may not receive credit for a class if he or she has more than five days of unexcused absence during a semester. The Bill does not define excused or unexcused absences, apparently leaving that to the individual school districts. Most districts are expected to follow the guidelines adopted last spring by TEA and the University Interscholastic League (UIL) which state that a student may be away from class no more than 10 days per year for scheduled school-related or extracurricular activities. There are some potential problems with this



regulation. Although there is nothing in the official regulation to preclude a student from taking all 10 days within one semester, most district officials contacted are imposing a five-day-per-semester rule to protect their accreditation. There is still confusion, however, in that if the student chooses to use the five days for some some extracurricular activity, he or she technically will be unable to participate in subject-related activities that may be required for a grade. This is an area that apparently will have to be clarified either by TEA or by the Legislature.

**Extracurricular Activities**

Other than specifying that the State Board of Education will limit participation in and practice for extracurricular activities during the school day and school week, the primary change comes in the grade requirement. Beginning in January 1985, no student can participate in any extracurricular activity after a grade reporting period in which he or she receives a grade lower than 70 in any academic class. This includes all activities, band, choir, drama, debate as well as athletics. School principals have the option to suspend this rule for students failing honors or advanced classes.

The only exception to this is that a student may not be suspended from activity during the "initial grade reporting period of a regular school term on the basis of grades received in the final reporting period of the preceding regular school term." In simplified terms, this means the first six weeks of the fall term are free from any restrictions. This, according to one TEA official, was probably an oversight that "unintentionally coincides with two-thirds of the fall activity season," and he predicted that this is one area that will be revised when the Legislature reconvenes in January.

It also is not clear how subject-related activities will be handled. If, for example, a field trip is a require-

ment for one course but necessitates students' missing other classes, school officials apparently have the authority to decide who may or may not participate.

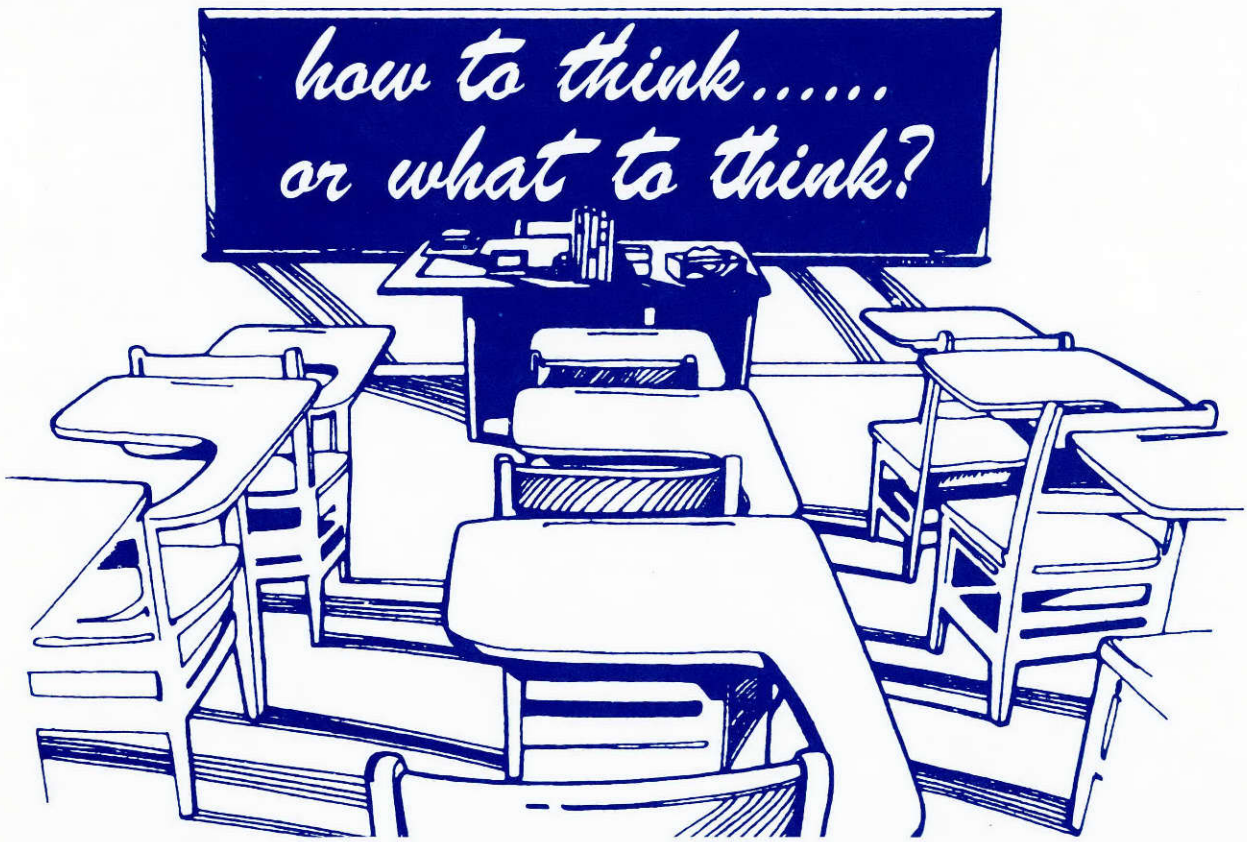
**Discipline Management**

Every student in the state should have received a new code of conduct manual when school began this fall, which detailed the changes mandated by House Bill 72. Apart from the tutorials and parent-teacher conferences, the law also requires increased parental involvement. Students guilty of serious misconduct or those identified as members of high school sororities, fraternities or secret societies will be placed in alternative education classes. Their parents will be required to sign an agreement signifying their support of the discipline program and pledging to attend teacher conferences and aid the student in remediation. They may be asked to attend counseling sessions, which, apparently, will be financed by the school districts. Parents who refuse to cooperate can be taken to court and could be held in contempt of court.

Students who assault a teacher or another person on school property can be expelled immediately without being referred to alternative programs.

*Despite all the discussions, reports and work that prefaced both Chapter 75 and House Bill 72, it would appear that a central ingredient of educational reform has not been addressed—that of curriculum content. Much of the discussion on a national level has centered on content, with educators such as Paul Hurd and James Rutherford offering the opinions that content and presentation of science, at least, are reasons for student disinterest and subsequent lack of performance.*

*One member of the Select Committee on Public Education, Dean C. Corrigan, dean of the College of Education at Texas A&M, addresses this and other issues relating to the reform effort in the following interview. A corresponding article by Rutherford also is reprinted in this issue.*




*Dr. Dean C. Corrigan, dean of the College of Education at Texas A&M, was the only member of the Select Committee on Public Education who has taught in the public schools.* ***Marine Education*** *interviewed Dean Corrigan in July to get his assessment of the committee's work and the subsequent education reform bill enacted by the Texas Legislature. The following is an edited transcript of this interview.*

*Q. You were quoted recently as saying that you are worried that five years from now test scores will go up because the 20 percent of the kids who need the most help will be out on the streets. Was this an accurate quote?*

A. That was accurate, although I did add something else. My position is that more time on things and making things tougher are not necessarily better. Let me give you an example. If you add an hour to the school day for a teacher who already has six periods with 30 in each class and doesn't have enough time to give the students feedback on their homework now, giving more homework and adding another period isn't going to help. I was talking about the quality of time. How do we use the time we have now to the best advantage? Proposals like reducing class size, as has been done with the first four grades so teachers can individualize instruction and develop specific approaches, are things I strongly support. But just extending the school year and coming up with new curriculum requirements without any time for teacher inservice or retraining isn't going to do much.

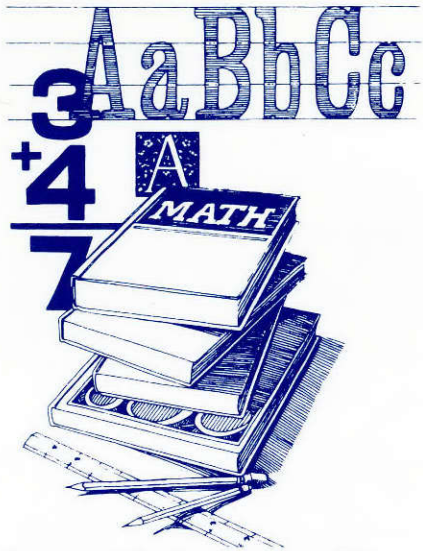
In New York State, for example, they added 20 days, but 10 are man-

datory days without students so teachers have time to participate in intensive workshop sessions rather than doing it before or after school. This makes more sense. The tendency now seems to be more this, more that, as if what we are doing now is really what should be done. The thinking seems to be that just more of the same will be better in some cases.

It's a very complex issue that most lay people don't really understand, especially legislators because they want to give the public the idea that they are setting new, tough standards. So they come out against what they call social promotions. As a child, I went to a school where there was a student who was 15 years old and he was in the third grade. During recess all the kids rode him like he was a horse. We don't want to go back to that. My view is that we should provide every child the opportunity to become all he is capable of becoming. That's what the school should do. We shouldn't be setting up these arbitrary sets of curriculum. Some kid may be 15 years old and just learning to read.

We do terrible things with some of the structures we set up. Instead of taking test scores and comparing kids, we should be testing what we've done for that student. How has this child progressed from lhe point we started with him? That's a very complex concept to get across—even to the average person on the Select Committee. It was the third meeting before some of the members realized that all kids are different and that they need different educational approaches and materials. The combination of many of the new mandates, such as stressing that every child has a passing grade in every subject before they can participate in extracurricular activities, are all very good things to be for politically. But when you try to implement them, you may get some kid who has four A's who wants to take a subject just to delve into it, one that he knows nothing about. He's less likely to take that subject if he knows he can't have some risk in taking it.

There's a lot of emphasis on the grades, a lot of emphasis on tougher. I'm not for being soft, but I think you need more than that to make a great school. You have to have a creative curriculum like the things you people in the Sea Grant Program are trying to do, and creative materials where you get children involved in exciting ways in studying different subject areas with differentiated materials at their level of reading so they can really be turned on. It's not a matter of the professor saying, "Here are 15 ways you are going to fail science if you don't do what I tell you." It's a matter of, "Here are 15 ways you can succeed at science and I'm going to be the best teacher in the world and I'm going to turn you on to science."




*Q. Under the new grading system, and considering the potential penalties such as retention in grade, failure to graduate or exclusion from extracurricular activities, do you think teachers will begin to measure a child's progress against himself rather than against his classmates? Or do you feel that teachers or administrators will be so test-score conscious that they will rely totally on norm-referenced grading?*

A. There is a danger that that will happen. What you begin to do is define the curriculum on the basis of what is on the test. People start teaching to the test. Right now we have more of that than I've ever seen—this over emphasis on testing as a method to motivate people to do things. The most dramatic example I've seen lately of the misuse of tests was the government's use of the SAT to compare states. That's absurd. Anybody who knows anything about testing knows it's just nonsense to take the SATs especially as a norm-based test and compare Arkansas with Texas. In the first place, not all seniors take the test, and in some states, they only report a certain percentage that take it. For the Commissioner of Education of the United States to use those test scores for that purpose just shows that people don't know what tests are set up to determine. They are not supposed to be used for that purpose. The tests aren't bad, it is just the way we are misusing them.

We should use the tests as diagnostic instruments to find out where kids are, then try to teach them something and see if they've learned. Use them as feedback for the teachers as well as for the students. But we never go over many of the tests we give with the students. They're given at the end of the process, the end of a unit or the end of a semester, and they're used to label kids rather than used for the teacher to say, "Here are some areas that this child doesn't know very well and my job now is to help him learn these areas." This has to do with the way schools are staffed and how tests are used once they are given. A lot of schools don't have the advisory system set up to help teachers use this type of data. By the way, that was an aspect of this whole process that was not dealt with at all. There is nothing in the bill (House Bill 72) or in the committee report that has anything to do with counseling or advising. That was completely left out.

*Q. The wording of the bill gives the impression that some members of the Legislature seems to believe that most students are severe discipline problems. One legislative aide told us, quite seriously, that students "act like animals." What has happened?*

A. The tendency now seems to be to set up rules and regulations as the answer to discipline. Discipline is basically a curriculum issue in my opinion. If you have an exciting curriculum for the students that matches their interests and abilities, then you don't have any discipline problems. You create situations where teachers can really interact with students, and provide the right kind of materials and the right size groups. Some of the most effective things my own kids have had in science, for instance, have been outside of school. The teacher takes them to the swamp and they do water samples. Or they go to a hybrid apple farm and see how the experiments are going. The emphasis is on inquiry beyond just books and using the whole community as a resource.

This, in my estimation, is the answer to a lot of the discipline problems. If you can create the conditions where teachers can really do

what they've been taught, you could solve a lot of the discipline problems. The problems are created when there are too many kids for the numbers of teachers and the numbers of exciting activities available. When you get 3,000 kids in the same three acres of brick and mortar, have them all moving at a bell going up one staircase and down the other and teachers have to act like policemen in the hallways, and, in some schools, when you put guards at the stairwells with dogs sniffing the lockers—that's not an educational environment. Teachers aren't very good policemen for one thing. They aren't trained to be, they don't want to be. They like the subject matter they are prepared to teach and they want to teach it, they want to turn other people on to it. You put a teacher in front of 300 kids in a study hall as a policeman and it changes the whole role. Kids don't perceive them as teachers, they perceive them as policemen. One you set up a situation where the teachers are the enemy and you have battles going on between the kids and the teachers, you destroy the basic interaction between student and teacher. The student no longer looks at the teacher as a scholar, someone who's there to help him inquire into a subject.

The best schools are those with a lot of excitement going on in terms of the curriculum, a lot of parent involvement and a lot of caring. Teachers, supervisors and parents don't want the kids to goof off and not do their homework because they care for the kids, not because of some test score. I worry now that we may lose that.

When we mandate all these rules and regulations and everything is controlled by a single state agency, all 1,089 school districts (in Texas) will look alike and act alike and evaluate teachers alike. The thread through this whole thing is to put more and more into some kind of centralized agency and look more like the Russian agricultural system than any American education system.

*Q. There are many more demands being put on parents in terms of cooperating with the schools in discipline management, including some that may be expensive such as requiring both parents and student to attend counseling sessions in the case of severe problems. Will this help?*

A. The idea is to get parents more

involved, but it's another example of trying to mandate something from a state level. I wish they had looked at these as guidelines rather than state mandates. When you try to develop a policy that is so restrictive at that level of specificity, it plays out so differently in various parts of the state.

Look at extracurricular activities. There are some parts of the state where it takes kids almost a full day to even get to another school, they're so far apart. That's so different from an urban center where you have schools within seven or eight blocks of each other. It just worries me that we put so much emphasis on the state to prescribe all this and have so little faith in the communities to do it. To me, the community's investment and sense of ownership in the educational system has been so important and viable in American public education.

I come from a part of the country that has town meetings. Every year the town council and the school board must appear in hearings to tell the people what they're doing and how well they're doing. That's direct accountability. I worry about losing this when we put all the responsibility and power in the state. Every curriculum will be prescribed, every school district will be accredited by a state group each three years, every teacher will be evaluated by the same guidelines, and every student will be tested. The whole emphasis seems to be on state-mandated tests for students and faculty which, in my opinion, destroy the autonomy of having individual schools and their communities working together to develop the best, creative program for the individuals they serve. Some gifted children should go way beyond those grade level requirements, but everything now will be evaluated in terms of norm-based tests on the grade level curriculum, which is totally absurd in terms of developing full potential.

*Q. If you look at the core curriculum spelled out in Chapter 75 and the new grading system, the content of the curriculum has not changed. Only the grading system has changed. Granted there are probably many students in the state who are not working up to ability, but there also are many children who are working up to their ability, and their ability puts them on the borderline. We have just moved the borderline. What happens to these children?*

A. The Committee, and particularly the chairman, was very disturbed that we assume that certain kids can't learn and therefore they don't. With the tracking system, in particular, minority kids often were viewed by teachers as only being capable of completing the third track. That, undoubtedly, has happened in some cases. The solution to that problem was to set up only one track and then to set the content for that track very high. The other solution would have been to set options and choices within the one track to match the particular level of ability of individual students. You start with the premise, right from the beginning, that each child is different, but each needs a chance to succeed.

You have kids in school today who are in regular classes but who are mildly handicapped. A lot of the committee didn't understand this. You can be 15 years old and still have problems reading. That doesn't make you any less a human being, that's just the way things are for you. No matter how hard you want to try to do it, you can't do it. Good teachers now have ways to help, but some students may never be able to read as well as someone else. They (some committee members and some legislators) don't understand that. They don't understand what's going to happen to that kid when you put a strict grading system on them, a norm-based grading system,

and flunk this kid for working as hard as he possibly can work with his particular handicapping condition. Just saying that you are going to disregard it isn't going to help that kid at all. A great many people would say you shouldn't build your school around this type of child, and that maybe you shouldn't have them in the classroom at all. But we have to accommodate them, because the public school is supposed to be for every child and is supposed to help every child develop according to his ability to progress. A lot of people are setting up a system that won't allow this.

The best school systems I have seen are the ones that don't have any grades. Students are evaluated on how well they move ahead to the next level of challenge. You may have some kids who are doing fourth or fifth year college work while still in high school because they are ready and able to do it. You may have another child who hasn't progressed up to a pre-determined level because he isn't able. So what? He should feel successful at what he's able to do, and he shouldn't be written off. Everyone should continue to work with him, but this is a different concept than is being described now.

I am totally for teaching the basic skills programs. I think you really need it—to teach kids to read, write and spell and to do math and science. We also need to provide the flexibility to give kids options, to show them a lot of interest areas, because we are going to need people with all types of knowledge, not just the narrow, basic skills program. The ability to learn how to think is paramount; critical thinking skills will still be the most important of all the basic skills in the year 2000, but it's harder and harder for teachers to maintain the thinking process today. Kids fast learn that tests are what count.

This will drive more teachers out of teaching than salaries. You take away their opportunity to decide how to teach their subject in creative ways. When someone prescribes exactly what the teacher is going to teach on any given day and what the test is going to test, that's a pretty staid, unexciting, uninteresting way to deal with a subject you love. We have this really good teacher here in town who teaches government. He has his students participate in lots of debates and mock elections, he gets them into the city council as council members, and he has them be judge and jury when he teaches the court system. That's tougher to do when you have to cover the syllabus that someone else has given you and the kids have to take a test based on that syllabus. I'm sure a teacher like this must have some tough decisions to make now, particularly when he's trying to do this five or six periods a day for 150 kids. Yet the payoff for this type of learning is so great, the kids re-

# *Science, math uproar dwindles to muted echo*

*Science and math education have recently gone through another cycle of extravagant popular and political concern, followed by near-disappearance from the public stage. The following perspective on the latest round and its consequences first appeared in the May 1, 1984, issue of* ***Science & Government Report****. SGR spoke on April 18, 1984, with one of the most seasoned veterans of national education politics, F. James Rutherford, former Assistant Director for Science Education at the National Science Foundation (1977-80) and the first Assistant Director for Educational Research and Improvement in the U.S. Department of Education (1980-81). Once a high school science teacher, Rutherford holds a doctorate from the Harvard School of Education and from 1971-77 was Professor of Science Education at NYU. He currently is Chief Education Officer of the American Association for the Advancement of Science. The following is a transcript of this conversation, edited by* ***SGR****.*

*Q. What's come out of the past two years of public concern about science and math education?*

A. It's far too early to know if the kids are learning any more, but there's a lot of activity around the country. The action is in the states. They're passing legislation, bumping up graduation requirements, they're putting in rules about "social promotion"—they're against it. They're saying you can't play basketball if you don't have a C-minus average. There's some money beginning to flow in from state legislatures. Some places have passed tax measures. A few places have increased teachers salaries, though pretty marginally, I think. There have been quite a few attempts to put some backbone in the system. Many are ill-advised, but at least they're making the effort. There are things like merit pay systems in quite a few states now. California has a version, Florida has one. There's some motion on the side of the universities to restore admission requirements that call for a little more science and math.

*Q. You sound skeptical. Are you?*

A. My concern is that most of it isn't very structural. There's very little going on out there that deals, for example, with the problems of content. What science should they study? You tell the students they've got to take three years instead of one or two. But which science for which purpose? Do we really mean that rhetoric about all the students taking all that science, or is it just forcing them into chemistry and physics they're not now taking.

*Q. Is there a parallel interest in curriculum revision?*

A. There's very little discussion of curriculum out there. Almost none. The talk is about taking more courses.

*Q. Does that suggest that curriculums are on the shelf and ready for use? Or is curriculum simply being ignored?*

A. I think it's largely being ignored for the moment. For example, what do you see NSF doing? They're giving away some money now to people to develop materials. Now, if you go over and ask which materials for which courses for what purposes, it's all very vague. There hasn't been an effort, either at the national or at any state level that I know of, to reexamine the premises about what it is you want kids to learn in science and mathematics. There hasn't been an effort to look at the existing courses that are in place or that were generated before and ask whether those things fit or

**Q & A: Whatever Happened to Education Issue? Washington, D.C.:* ***Science & Government Report****, 14:8, pp. 4-7, May 1, 1984. Reprinted with permission of the publisher.*

member far more than they ever read in a book. Of course this type of program may be lost anyway with the state now mandating how many days you can have out of school. It takes a day to follow through the council meetings, and he may not be able to take all his students away from their other classes.

The whole idea of taking away something kids like if they don't do better in some other area is a motivator only for some kids. We actually had a proposal one time during the Select Committee meetings that any kid who got an A could get a driver's license at 15; if they got a B, they had to wait until 16; if they got a C, they waited until 17; and if they got a D, they had to wait until 18. If they flunked their courses, they'd never get a driver's license. That rationale, where you can threaten somebody and then expect that they are going to do what you want them to do, is the least likely motivation model to success.

If we could think of having creative, exciting school where people work hard—learning is hard work—and see some purpose in it or someone enthusiastic turns them on to it, then we would see success. We're going completely the opposite way in schools, designing more rules, more regulations, more mandated things and trying to treat 18-year-olds as robots. We're telling them to do this and do that, test this and test that. We're categorizing all these kids as if they're dunderheads who don't want to work and do things. Most kids want to learn. Most teachers want to be good teachers. It's no fun not to be a good teacher. Nobody wants to be a bad teacher, but threatening them isn't the way to make them a better teacher. Teaching them how to be a better teacher is the way to deal with that. We treat teachers as executors of someone else's orders. When we begin to treat them as professionals, they will act as professionals.

The approach seems to be the other way, it is a top-down system starting with a state-controlled system. We're going to tell everyone what they should do, and make sure they do it or they're going to have to bear these types of consequences. This, rather than going from the bottom up and saying let's get the teachers to create the best educational program possible, let's put as much responsibility on the teachers and the students as they can handle to design the most exciting system that can be developed, have them be accountable to the local communities, periodically have public hearings to talk to each other about what they are doing, and assume that people really will do a lot of these things. And, they'll do them. And a lot more of them will do these things with this type of motivation than in response to someone who thinks he has all the answers and wants to get everyone running in lock-step.

not, and if they don't, to start investing in curriculum development. I don't see much motion at all toward serious curriculum development.

*Q. Are the textbook publishers filling the gap?*

A. Look at the books. They rarely deal with contemporary science. They cover typically 600 pages of classical stuff. It's short on applications and on broad conceptualizations. They're encyclopedias of things that are accepted in the various sciences. It's not at all clear that for purposes of citizenship and jobs that that kind of science has any payoff. The books are mostly now, in my judgment, very dull. The market indicates that. If you don't legislate the kids into it, they don't do it. They don't think they ought to do it, because it doesn't have anything for them. Besides it's hard.

*Q. Is the typical curriculum too remote from the world that the students see around them?*

A. They think it's remote and they think it's difficult. The physics courses tend to be somewhat watered-down versions of college physics courses, which are watered-down versions of graduate courses. What I'm claiming is that there hasn't been a thorough reexamination of what it is we ought to be teaching in science, maybe not in a century. What we did in the sixties was accept the notion of the major disciplines, biology, chemistry, and physics, as to what should be the content of each of those. And I think that had some impact. But still, the vision was primarily of students who were going to go on to professional careers. Now all this rhetoric from the National Science Board Commission and all the others is that everybody does science. And I think we at least ought to examine that. That's been kind of left out of the equation in the process of trying to get students to take more.

*Q. Are you suggesting that we're overdoing it by saying everyone should study science?*

A. No, but I'm skeptical that the traditional course is the course for everyone.

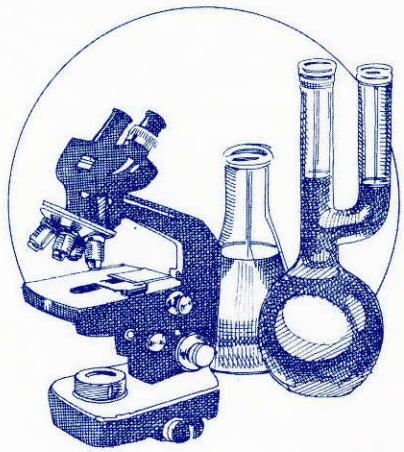
*Q. What might the National Science Foundation be doing that's now neglected?*

A. I think they should, as little as possible, replay last time—the post-Sputnik period. Some of the work ought to be done over again, but the trouble is it seems a little tired now. My belief is that they should take a look at the territory and say, Well, of all the things that need doing, where's some that we think we can do? And go out and get it done. That is, stop waiting for proposals to come in with good ideas. Take some territory, for example, curriculum. They should say, Look, what do we have, what is the curriculum, what do these kids in the seventh grade actually take? What if we got all of them to take science as juniors and seniors, what is it that they should have? Get the best people in the country. Tell different groups, We want your best thinking. And out of that maybe move toward the support of some curriculum development on some new terms. A lot of claims are being made about what students know and do not know. The testing is pretty feeble. It was in the 1920s and '30s when most of the testing theory was developed that we rely upon. Isn't it time to get a bunch of really first-rate people now who understand science and who understand new testing techniques to see if it isn't possible to find some better ways of discovering what kids know in science and mathematics? To see what they know individually and as groups, so we can make some decisions based on something more solid? Now, testing is a touchy proposition.

*Q. Ideologically and politically?*

A. Yeah, everybody is afraid that tests will drive the machine. Well, tests may drive the machine. That just tells me that instead of having ETS (Educational Testing Service) or somebody do it, maybe there are other options, if we investigate it. Take the question of the use of educational technology. It may be that we can't solve the teacher problem.

# 'get involved' means little to parents in South Bronx



Maybe we can't get two-and-a-half-million people who have the attributes that you'd like to have who will take those jobs. So, you say, What are other ways of thinking about it? Maybe if we could really use technologies imaginatively and massively, that would allow us to really reduce the teaching staff, particularly at the high school level, and use those people who are really good in different ways and really pay them. There's no reason high school physics has to be taught five days a week. If you have a good physics teacher, why not two, three days a week? Why not six weeks on, six weeks off? Particularly when you have video tapes, computers, access to information. All over the world, there are good examples of open university programs that successfully use these techniques. But our dumping all that money into putting computers into schools—well, that mainly amounts to doing current textbooks electronically. We're asking the wrong questions about computers in the schools. What we should be looking into is how we can exploit contemporary communications and information technologies. We should look at use of satellites, cable transmissions, on-site video taping, computers, video disks, radio—a vastly underused technology. And you would get some first-rate groups around the country, top engineers and scientists, educators and content people, and they would start working to see if it isn't possible to develop the mechanics of essentially the transportation system of knowledge. And then, if that were designed and developed, then you could use some local resources for part of it, federal resources for other parts of it, and the filling up of those channels becomes fairly easy, once they exist. The way it is now, for example, if somebody makes a good film or a television series, you can't get the stuff delivered into the classroom, because the delivery costs are too complicated.

*Q. Is that a role for NSF?*

A. Yes. NSF is small and big when it comes to money. It's small, if you try to underwrite teacher institutes all over the country, or if you give people money here and there to develop books and films. But it's a big chunk of money if you used it somehow or other to undermine the system, or at least get down to some basic elements of the system. Why hasn't NSF taken a chunk of the available money they weren't able to spend last year and used it to support some bright people and send them off to Woods Hole (Oceanographic Institute) and say, Don't come back again until you have some ideas and structure. And send another group out someplace else. Get some external thinking done. They could have done all of that last year and then be pumping some money out. Now it's an embarrassment. NSF isn't asking for any increase for next year (beginning fiscal year Oct. 1, 1984) for science education. I assumed that OMB (Office of Management and Budget) was responsible. But at OMB they say, NSF is choking on the money they've got; why should we give them more?

*Q. Is the National Institute of Education playing a role in science and math education?*

A. There's practically no money at NIE beyond the funds that are committed to the regional labs and centers. The NIE has never been able to get out from under that. The regional labs could take on some of that work, and maybe that will happen now that they have to compete for money. Maybe the regionals will come in with some ideas, instead of just saying, Let us continue to do what we're doing. They're a little frightened out there, and that's good. I hope that when they make the next round of awards, they will really look at the ability of the institutions. Part of the problem at NIE is that during the first couple of years, the Reagan Administration wanted to get rid of the whole enterprise. So they got rid of some people and put in some ideologues. I think a lot of that is over now. Maybe now they've settled down, and will start to do a little more. But they don't have much money for science and math. The Department of Education keeps saying it has some. (Secretary of Education Terrel) Bell has a discretionary fund he can use for it, and he keeps talking about it, but I don't see results.

*Q. The President's Science Adviser (George A. Keyworth II) and the Director of NSF have said that a key element of their strategy is to get university science departments more involved with the local schools. What's happening with that?*

A. I don't see anything happening. I see a few places where there's a little good will. But I think that's as naive as expecting the Assistant Director for physics at NSF to give education grants. The bloom is off the sage. The young faculty members know they have other things to do if they want tenure; the middle-career people are all caught up in doing research, and don't want to spend time out in the schools to get to understand the problems. Sometimes the very senior people can become statesmen. But they're oftentimes better in the role of working on big curriculum projects. I think something like that could be useful, if there were a framework they could fit into. But, to preach to scientists that they ought to go out to the schools—well, they're as uncomfortable going to the schools as school people are going to the university. (NSF Director Ed) Knapp keeps saying it isn't going to get better until the parents get involved. But what's that mean for a parent in the South Bronx? It's kind of a truism that's neither here nor there. It's like the truism that money won't solve the problem. Of course, it won't. But it sure isn't going to be solved without money. The idea is to get the money and be smart in using it.

# books  & things

Two magazines, one new on the market and the other new to ***Marine Education***, should be of interest to teachers and school librarians. The new magazine is ***Nautica***, which, according to its masthead, is the "magazine of the sea for young people." ***Nautica*** started in January 1984 and becomes a monthly magazine in October.

The three issues previewed thus far have had good color photography and well-written and easy-to-understand feature articles. ***Nautica***'s publisher Wayne Wendel says the magazine is geared toward upper elementary or middle school ages, but the articles are equally informative for older readers. Sea-related words are defined in a glossary, and each issue includes games or activities that would be easy to incorporate into the classroom.

Subscriptions are $14.00 per year. Inquiries should be addressed to ***Nautica***, Pickering Wharf, Salem, Mass. 01970. The magazine's cover lists a newstand price of $2.50 for those who prefer to review an issue before subscribing.

The second magazine is ***Humane Education***, published by the National Association for the Advancement of Humane Education, a division of The Humane Society of the United States. A quarterly magazine, it is sent to Humane Society members for an annual fee of $10.00.

***Humane Education*** covers all types of animals, both wild and domestic and terrestrial and marine. Each issue includes at least two feature articles, plus book reviews, learning center materials and copy masters for use in a classroom. Appropriate grade levels are indicated for all articles and activities.

An interesting addition to the magazine is the Humane Education calendar, which notes little-known facts and anniversaries. The March issue, for example, noted that June 1 was the beginning of "Adopt-a-Cat Month," while the June magazine revealed that Sept. 1 marks the day that the last surviving passenger pigeon, Martha, died in captivity at the Cincinnati Zoo (in 1914).

Inquiries about ***Humane Education*** should be sent to the editorial offices, NAAHE, Norma Terris Humane Education Center, Box 362, East Haddam, Conn. 06423.

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The Northern New England Marine Education Project has eight marine education units and two videotapes available for grades 5 through 9. Although the general focus of the material is the Gulf of Maine (which extends from Cape Cod to Nova Scotia), at least three of the units can easily be adapted for use anywhere in the country.

***What Are the ABC's of Marine Education?*** is an introductory unit that can be used in the classroom or in an inservice program. It introduces a variety of marine topics, and includes background information for the teacher, instructional techniques and classroom activities dealing with coastal issues.

***What Is Our Maritime Heritage?*** tells the history of ships and their importance to us today. Sections on maritime history, boat construction, the basics of sailing and New England shipping are included. Classroom activities introduce students to the parts of a vessel, fan sailing, sea chanties and scrimshaw. A good companion unit is ***How Do People Use Lighthouses and Navigational Charts?*** This unit details the shape of the sea, its coasts and contours by introducing students to navigational aids and charts, road signs of the sea, maps and lighthouses. Classroom activities range from a log writing exercise to the meaning of chart symbols. A variety of useful tables and an annotated bibliography are included.

Each unit is $5.00; all classroom activity sheets are designed for easy in-school duplication. The units are available by writing Marine Advisory Program, 30 Coburn Hall, University of Maine, Orono, Maine 04469. A complete listing of all units and videotapes also is available by writing the same address.

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The latest offerings from the country's various publishers are often beyond the budget of individual teachers, but there are some to recommend for school or public libraries. Teachers might particularly ask the librarians to investigate —

***Alexandra*** by Scott O'Dell (Houghton Mifflin, 1984, $12.95, ages 12-up). There are those who believe anything by Scott O'Dell is worth investigating, and his newest book is certainly getting good reviews. Set in a Greek community in Florida, the book is about a 15-year-old, Alexandra, who learns the art of deep-sea sponge diving after her father dies. As with most of O'Dell's books, there is some suspense and conflict, and a description of a way of life that will be new to most readers.

Pre-schoolers and beginning readers should enjoy the paperback reprinting of ***The Cloud Book*** by Tomie dePaola (Holiday House, $5.95, ages 3-5). Called a "beguiling mixture of entertainment and information" in its original hardback version, color illustrations in dePaola's inimitable style illustrate a text that describes cirrus, cumulus stratus clouds and other kinds. Brief anecdotes and funny sayings add to the book's enjoyment.

NTSU LIBRARY

# Tinnin announces two special sessions

Chemistry, physical oceanography and physical science teachers have an opportunity to learn more about physical and chemical oceanography in a special workshop Oct. 26-28, 1984, at The University of Texas Marine Science Institute. The registration deadline is Oct. 12 for this special session coordinated by Richard Tinnin in Port Aransas. Attendance is limited to the first 30 registrants.

The workshop begins early on Saturday morning (Oct. 27), but Tinnin encourages all teachers to arrive Friday evening. The session will end by mid-afternoon on Sunday, Oct. 28.

During the workshop, teachers will spend one morning aboard the R/V LONGHORN collecting specimens and performing tests. During the cruise, participants will take box-core and water column samples and do some sediment work. Onshore sessions will include lectures and laboratory workup of the collected samples.

Tinnin will conduct a second specialized workshop on seaweeds and seagrasses, Nov. 30 through Dec. 2. This session, limited to 70 participants, is intended for all biological or life science teachers. The registration deadline is Nov. 16, 1984.

The workshop includes lectures, field collection and identification, and plant pressing and culture techniques.

Each workshop is available to teachers in grades 7 through 12 at a cost of $45.00. This fee includes registration, supplies, handouts, dormitory rooms for two nights and five meals. Registrations or inquiries should be addressed to Richard Tinnin, The University of Texas Marine Science Institute, Port Aransas, TX 78373 (512/749-6729).

Tinnin's spring workshop schedule includes another specialized session on phytoplankton and zooplankton (March 22-24, 1985) and a basic teacher orientation workshop (April 19-21). The latter is considered an introductory session for teachers with little or no marine science background. Further details, including registration deadlines, for the spring workshops will be announced later.

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