

The Importance of Research

OBJECTIVES/RATIONALE

Scientists are amassing new information about biological life processes and developing new tools and technologies at an astounding rate. The research horizons are expanding rapidly - as are the benefits and applications of the research. The student will gather information about future careers in research using a variety of sources.

TEKS: 121.12 3D

TAKS ELA 1, 3, 4

KEY POINTS

According to Conroe-Dripps, cardiovascular researchers traced the roots of the top ten medical breakthroughs and found that 42% of the concepts stemmed from someone who simply wanted to *understand* how something worked – something of *personal interest*. The breakthroughs were simply creative offshoots of their simple investigations of a topic of interest.

A. What Is Research?

Research is a scientific process of inquiry and/or experimentation that involves a purposeful, systematic, and rigorous collection of data. Analysis and interpretation of the data are then made to gain new knowledge or add to existing knowledge with the objective of developing an organized body of scientific knowledge.

Research is **NOT** going to the library to collect existing information on a specific topic and writing a review of the material. To consider a work as scientific research, we do use past and present knowledge to answer new questions and add new knowledge to the foundation of existing knowledge.

Research involves finding answers to questions or solutions to problems, discovering and interpreting new facts, testing theories in order to revise accepted theories and/or laws in the light of new facts, and formulating new theories.

B. Why Is Research Important?

The investment our nation has made in research has provided us with longer lives, better health, and lowered cost of illness. The recent technological advances that have resulted have had phenomenal applications in many different aspects of the world economy.

Health care costs associated with chronic disability are some of the most expensive. Rates of chronic disability in the U.S. have been declining at an accelerated rate. This reduction

in long-term disability results in a smaller nursing home population and saves billions of dollars.

The use of new pharmaceuticals has reduced hospitalization rates and thereby reduced the costs of hospitalization. Improved understanding of molecular biology will result in more efficient and effective pharmaceuticals and a lower cost of drug development.

Progress in medical-related research has been outstanding. However, there are still millions of Americans suffering from Alzheimer's disease, arthritis, cancer, stroke, diabetes, heart disease, and mental disorders. The pain and hardship that these illnesses impose on victims and their families cannot be measured. However, the financial burden on our society is substantial.

It is reported that there have been more than 30 new pathogenic microbes and over 21 re-emerging infectious diseases since the early 1970's. We must prepare for these new challenges and future threats to human health.

The tremendous potential for progress in medical research will be realized only if there is a steady flow of collaborative new insights from all fields of science. The contributions of chemistry, physics, biology, mathematics, computer science, and engineering are essential to improving the quality of life.

If our commitment to research is maintained, we can expect significant progress in the future toward the advancement of health and quality of life. In last ten years alone, research has propelled a remarkable transformation in our understanding of the life sciences and has exposed a bounty of new ways to prevent, treat, and cure disease. Major threats to public health have been reduced, the quality of life has improved, and life expectancy continues to rise. Research-based knowledge reduces the burden of illness by lowering incidence rates for many diseases while raising the quality of life for those who are still affected.

Investment in research has also fueled the development of new industries and increased the productivity of existing ones.

Maintaining world leadership in research is vital for the prosperity, prestige, and security of the nation. We need a new generation of research scientists with an interest and commitment to research in order to realize continued benefits. We cannot afford to miss the opportunity to prepare for these new and emerging careers!

C. About The Scientific Research and Design Course

Scientific Research and Design is a multifaceted course designed to stimulate interest in various fields of medical research and offers the student the opportunity to pursue a topic of personal interest.

Course activities include guest speakers, field trips, written/oral assignments, journal forum, student notebook, logbook, a written technical paper suitable for publication, and presentation of the project to a panel of medical professionals in the community.

Course content includes an overview of the components of the scientific method, research designs, data collection instruments, statistics, elements of proposals and scientific papers, the use of presentation software, and public speaking tips. Lessons provided will assist students in learning the concepts to be applied in their own research projects.

Students will be awarded one science credit for successful completion of the course (meeting the 40% laboratory and fieldwork requirement) while fulfilling the requirements for Health Science Technology Education. This course also satisfies the research project requirements for graduation under the Distinguished Achievement Program.

This course is an excellent preparation for the college-bound senior.

ACTIVITIES

Gather information from various sources about emerging careers in research in an area of interest. Create a display to disseminate the information to classmates utilizing the HOSA guidelines for Career Health Display:

MATERIALS NEEDED

HOSA guidelines for Career Health Display:
<http://www.hosa.org/natorg/sectb/cat-iv/chd.pdf>

ASSESSMENT

Group Project Rubric

Suggested Timeline

Aug. 13-14	
Aug. 17-21	
Aug. 24-28	
Sept. 01-04	
Sept. 07-11	
Sept. 14-18	
Sept. 21-25	SECTION II
Sept. 28-02	(research preparation)
Oct. 05-09	
Oct. 12-16	
Oct. 19-23	
Oct. 26-30	
Nov. 02-06	
Nov. 09-13	
Nov. 16-20	
Nov. 23-25	
Dec. 01-04	SECTION III
Dec. 07-11	(research implementation - lab/fieldwork)
Dec. 14-17	
Jan. 04-08	
Jan. 11-15	
Jan. 18-22	
Jan. 25-29	
Feb. 01-05	
Feb. 08-11	
Feb. 15-19	
Feb. 22-26	
Mar. 01-05	
Mar. 08-12	
Mar. 22-26	
Mar. 20-01	
Apr. 05-09	
Apr. 12-16	SECTION IV
Apr. 19-23	(presentation preparation)
Apr. 26-30	
May 03-07	
May 10-14	SECTION V
May 17-21	(final presentation)

NOTE: This curriculum is student-paced and may be individually tailored. Units may run concurrently and may be interchangeable

Scientific Research and Design Suggested Due Dates

Topic Chosen	Aug. 28
Mentor Recruited	Sept. 28
Proposal Submitted	Oct. 28
Project Implemented	Nov. 06
Project Re-evaluation	Jan. 15
Data Collection Complete	Mar. 12
Scientific Paper (rough draft)	Mar. 26
Mock Presentations	Apr. 19
Scientific Paper (final)	Apr. 26
Oral Presentations Begin	May 03

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Scientific Research and Design Course Expectations Agreement

STUDENT NAME _____ ID NUMBER _____

BEHAVIOR

The following is an overview of the expectations for student behavior in the classroom as well as 1 functions related to the Health Science Technology Scientific Research and Design class.

Students are expected to conduct themselves in a manner so as not to cause any disruption in the teaching/learning environment of the classroom. Students who are found to be not participating in the expected scheduled course functions outside the school will receive an initial reprimand from the instructor. Should the behavior continue, the student will be sent to the administrator for disciplinary action which may include dismissal from the class with loss of credit.

When participating in official functions related to the Health Science Technology Scientific Research and Design course either on the school premises or in the community, students are expected to behave and dress in a professional manner. Students will not be allowed to wear jeans, shorts, t-shirts or tennis shoes to these functions unless the instructor indicates the need to wear such clothing. Any questions or concerns about the students' ability to comply with these requirements must be addressed with the instructor a minimum of one week prior to the scheduled event.

COURSE ELEMENT DUE DATES

The following is a list of major required course elements and their due date. Other assignments with specified due dates will be made throughout the course by the instructor.

<u>Topic</u>	<u>Due Date</u>	<u>Date</u>	<u>Date Completed</u>
Course Specific Agreements Signed and Research Topic Chosen	8/30	_____	_____
Mentor Identification	9/30	_____	_____
Official Research Proposal	10/30	_____	_____
Project Implementation	11/10	_____	_____
Materials and Methods-Final Draft	02/01	_____	_____
Data Collection Completion	03/10	_____	_____
Scientific Paper – Final Draft	04/11	_____	_____
Oral Presentations Begin	04/15	_____	_____
Journal Submission of Article	04/21	_____	_____

All predetermined due dates will be strictly enforced. Any delay in assignment completion will result in a loss of points toward the specific assignment and possibly class participation points. Due dates may be changed only by the instructor and must be documented in the student logbook prior to the original due date. It is the student's responsibility to request a change in a due date prior to the assignment.

Any costs incurred during the design, implementation and completion of the research project are the sole responsibility of the student. The district, school, instructor, and mentor are not responsible for the financial support of the research.

I understand that disruptive behavior that interferes with the teaching/learning environment will not be tolerated. I also understand that professional behavior and dress is required during functions related to the Health Science Technology Scientific Research and Design course. I agree to comply with these expectations to my fullest ability. I understand my assignments include the above listed course elements but are not limited to these alone. I agree to complete the above assignments on or before the scheduled due dates. I also agree to complete any other additional assignments by the due dates they are assigned. My parents are also aware of these course expectations and agree to support them fully.

Student Signature: _____ Date: _____

Parent Signature: _____ Date: _____

Instructor Signature: _____ Date: _____