

Application for Federal Assistance

OMB Approval

COPY

102

1. TYPE OF SUBMISSION: <i>Application</i> <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Non-Construction	<i>Preapplication</i> <input type="checkbox"/> Construction <input type="checkbox"/> Non-Construction	2. DATE SUBMITTED 3/25/97	Application Identifier
		3. DATE RECEIVED BY STATE	State Application Identifier
		4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

5. APPLICANT INFORMATION

Legal Name University of Utah	Organizational Unit Center for Integrated Science Education
Address (give city, county, state, and zip code) Office of Sponsored Projects 1471 Federal way Salt Lake City, UT 84102	Name and telephone number of the person to be contacted on matters involving this application (give area code) Joseph D. Andrade, PI 801-581-4379 FAX: 801-585-5361 Joe.Andrade@m.cc.utah.edu

6. EMPLOYER IDENTIFICATION NUMBER (EIN):
 87 — 6000525

7. TYPE OF APPLICANT: (Enter appropriate letter in box) I

A. State	H. Independent School District
B. County	I. State Controlled Institution of Higher Education
C. Municipal	J. Private University
D. Township	K. Indian Tribe
E. Interstate	L. Individual
F. Intermunicipal	M. Profit Organization
G. Special District	N. Other (specify) _____

8. TYPE OF APPLICATION:

New Continuation Revision

If revision, enter appropriate letter(s) in box(es):

A. Increase Award B. Decrease Award C. Increase Duration
 D. Decrease Duration E. Other (specify): _____

9. NAME OF FEDERAL AGENCY:
 National Telecommunications and Information Administration

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: 11.552

TITLE: Telecommunications and Information Infrastructure Assistance Program

12. AREAS AFFECTED BY PROJECT (cities, counties, states, etc.)
 Utah and surrounding states

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:
 Education and Lifelong Learning (Primary)
 Health (Secondary)
 "Measurement and Medicine: Normal and Abnormal You!"

13. PROPOSED PROJECT:

Start Date	Ending Date
7/1/97	6/30/99

14. CONGRESSIONAL DISTRICTS OF:

a. Applicant	b. Project
Utah-2	Utah-1-3 Idaho-2 Wyoming-1 Nevada-2 Colorado-3

15. ESTIMATED FUNDING:

a. Federal	\$ 390,308	.00
b. Applicant	\$ 154,756	.00
c. State	\$ 249,180	.00
d. Local	\$ —	.00
e. Other	\$ —	.00
f. Program Income	\$ —	.00
g. TOTAL	\$ 794,244	.00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES THIS APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:
 DATE 3/25/97

b. NO PROGRAM IS NOT COVERED BY E.O. 12372
 OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

Yes If "Yes," attach an explanation No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

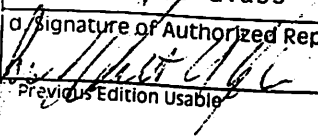
a. Typed Name of Authorized Representative Robert G. Glass	b. Title Director	c. Telephone Number (801) 581-3003
d. Signature of Authorized Representative 		e. Date Signed 3/25/97

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Executive Summary

This is a project intended for the Education and Lifelong Learning primary application area and for the Health application area. Measurement and Medicine(MM): Normal and Abnormal You! is a 30 hour program television series which uses personal health and medicine as the key motivator to enhance science literacy and education. The first part focuses on measurement of personal physiology - addressing what is "normal"? The second part applies the measurement and observation skills to abnormality - to pathology - with the goal of return to health (to normality). Although the primary objective is life long learning and science literacy, this informed group will also become more effective users of our limited health care resources.

Medicine and Measurement

1. Purpose

Innovations in computer and imaging technology, medical sciences, and bioengineering are on the eve of changing the very fiber of how we do health care. This is news to people who are eighty years old as well as to people who are eight years old. Getting information across to them is not as simple as dissemination, it is a problem of educating people about new concepts and how these concepts apply to their personal health care.

Since there is little formal structure for reaching adults once they leave high school or college, educating them on new and profound innovations presents a challenge. Professionals from all disciplines have claimed the goal for education is to produce lifelong learners. We propose to produce a model for making lifelong learning convenient to adults. This model is intended to provide access and information to a diverse adult student population and the community at large who will have the tools and hopefully the motivation to understand their own personal health care better, making them better consumers of health care dollars and better utilizers of health care resources.

Our plan is to provide a program of delivery that neatly fits into the ways in which national surveys tell us how people obtain science news - through the television. Our plan also incorporates technology that has already proven to be successful in reaching individuals - CD ROM. Finally, the last technology has a high public profile and access is quickly becoming available and affordable to all Americans through schools, libraries, museums, zoos, industry, and even restaurants and video arcades - the Internet.

We will build from our past success of the *Science Without Walls* (see Appendix) television series to create a new series entitled *Medicine and Measurement*. The approach will be to use personal health and medicine as the key motivators for attracting adults to learn the fundamental aspects of physiology and science. The main technology for this project will include 30 one-hour videos for television broadcast via a local television network and an interactive web site for student office hours, general viewer questions, and to provide a library of supplemental teaching resource including computer simulation tools. The video production will be made locally using available telecommunication resources of KULC Channel 9, a University of Utah affiliated public television station in Salt Lake City. The telecourse will be broadcast in its entirety via this station which has access to approximately 80% of the State of Utah.

We will also use non-telecommunication resources that allow viewers to conduct lab experiments on their own or in mentored sessions at regional learning centers. These hands on "Labless Labs" and mentored "Briefcase Labs" (see Tables 1 and 2 in the Appendix) allow for self-directed and mentor-directed learning to reinforce information from the video lectures. This project will team-up with ongoing science programs like the Natural History of Genes, a genetic science teaching kit which is on the Internet at <http://raven.umnh.utah.edu>. This project has already built an infrastructure of state-wide teaching workshops and national professional organizations. We will also seek to collaborate with local health care systems such as Intermountain Health Care who provide education to groups of individuals for which they care.

Our initial intent is to deploy the project over KULC for a complete academic year. We will evaluate the strengths and limitations of the program after this initial trial based on the evaluation methods described in this proposal. This will allow the refinement of the interactive web site, the laboratory component of the teaching, and the strengths of the

telecourse video materials. Following this initial release, the goal would be to tighten the scripting and revising any material before going to a fixed media such as interactive CD-ROM or separate videotapes for remote site use.

Health care issues and medical diagnosis applies to all of us. How an individual understands his or her own medical diagnosis and how they are able to access this information is the problem our model addresses. *Medicine and Measurement* videos are designed to be used in "virtual university" and television settings nationally. The model to use video tapes and make CD-ROM, and Internet resources available dramatically increases the number of individuals with access to this information. *Medicine and Measurement* will be available to a viewing audience of one million adults beginning in the fall of 1999. We expect over 40,000 adults will have viewed at least one of the videos either on the television or in a clinical setting during the first year of project implementation. From this audience, we expect over 2,000 adults to access and interact with the web site.

2. Project Feasibility

The technical advantage of the proposed approach is that we can make use of an existing telecommunications infrastructure to provide information to a large adult population on basic science aspects of medicine. KULC currently broadcasts a number of courses throughout the region for college credit that are being used by traditional and non-traditional college students. The expansion of this approach is to develop the materials in a manner that the information is useful to the community at large who may not be interested in following a complete didactic course to gain this knowledge.

An alternative approach would be to use an existing interactive video program developed within the region. This has the opportunity to create multiple learning centers in different locations that would all have access in real time to the instructor for questions during the lecture. The disadvantage to this approach is that it requires all the users of the course to be at a specific place at a specific time. The proposed approach accommodates flexibility in individual schedules and is more amenable to developing stand alone subsets of the total course material for wide distribution throughout the region and elsewhere.

A disadvantage to using produced videotape for presentation of material is that it is fixed in time from its content perspective. There will need to be cyclic updating of video material as technology and advancement in medicine move forward. As well, new conditions that are not currently in the forefront of attention may rise to warrant being specifically addressed in the video material, for example, genetic cloning. The web site which will complement the video material will be updated regularly to provide new applications for experiment and simulation of physiologic conditions. This will include applications that are resident on the web site computer and a comprehensive pointer listing to other web sites of similar benefit. As well, changes to experiments, questions and common problems in comprehension of the material as expressed by users will be maintained at the web site.

The content will be broken down into a number of basic system and disease specific applications which can stand alone from the complete series and provide the teaching and information mission of the project. The programs would ideally be available for any hospital system within the region for broadcast in patient waiting areas, lobbies, and even individual patient rooms. This will likely be in the form of duplicate video tapes of specific materials with complementary access to the web site for user support, or the creation of CD-ROM based media that incorporates the videos and some of the hands on laboratory information into one package. Since the program aims are to provide a basic

understanding of the science of medicine and the disease state to non-science majors who are beginning their university careers, it should be technically understandable to anyone with a high school education.

Based on the success of the telecourse program with supporting web site and mentored lab assistance, we will work with the Natural History of Genes to complement their existing remote education programs which serve to train teachers from all areas of the region. "Master Mentors" will be selected from a pool of high school teachers and will be trained to do conduct lab experiences and educational workshops at regional learning centers. High school teachers are selected for this role due to their ability to incorporate the program into their teaching materials for their students and colleagues. These teachers are in key positions to educate, motivate, and inform young adults about general science and physiology and how they can apply their new knowledge to become better consumers of health care. These teachers are also better able to accommodate different learning styles as well as personal and cultural preferences, and are better able to disseminate the program within their regions.

Medicine and Measurement will first asks the question: Are you normal? The intent is to build a foundation of the basic laws and understandings of science including the principles of measurement. *Medicine and Measurement* then asks: Are you abnormal? This brings in the goal of medicine which is not only to diagnose and understand pathology, but to fix it or prevent it in the future (see Appendix for a complete listing of programs). Lab components will be available to reinforce concepts from the video presentations and allow participants to do self-directed and mentor-directed experimentation.

Lab components will demonstrate relevancy of a physiologic function. For example, "Chicken Bone Mechanics" uses an ordinary leg of chicken purchased from a grocery store to investigate properties of articular cartilage at bone joints, the effect of wear and abrasion on the joint function, and the strength and characteristics of the natural joint and bone materials relative to other common materials available around the home. In Virtual Neurosurgery, the user accesses a computer program which navigates them through a real patient's brain to explore location and reinforce understanding of function and pathology that occurs in the brain.

In the creation of CD-ROM based materials for this course, we will work to collaborate with the *Slice of Life* project at the University of Utah. *Slice of Life* was produced by Media Solutions along with the Eccles Health Sciences Library at the University of Utah in Salt Lake City. The primary purpose of *Slice of Life* is to encourage the development of multimedia applications for use in health sciences education. To that end *Slice of Life* produces and distributes a number of videodiscs, CD-ROMs and interactive computer software programs. Most of the software applications, as mentioned above, are linked interactively to frame imagery on both our *Slice of Life VI* and *Slice of Brain I* videodiscs.

Dr. Joseph Andrade, Project Director for *Science Without Walls* and Professor of Bioengineering, will lead the program development team along with Dr. Ken Horch, Professor of Physiology and Bioengineering who has experience in medical instrumentation, and Dr. Steve Kern, Professor of Anesthesiology at the School of Medicine who is experienced in clinical medicine. Dr. George Pantalos, an accomplished physiologist with significant biomechanical engineering experience and over 25 years doing scientific literacy projects with adult populations, will assist the team in content development from the technical and patient perspective. All members of the team are

committed to using the most effective educational strategies and delivery mechanisms for reaching the adult population.

In addition, a three to five person team of basic science, medical science, and clinical colleagues will be organized for each program and will suggest material which will be developed into a tight, informative script and text. This will include the School of Medicine, the medical clinics, and teaching hospital; the Departments of Biology; the Colleges of Pharmacy, Nursing, and related health sciences; and the Department of Bioengineering, which is very experienced in the development and application of modern medical technologies. To assure presenting the information at a level and ease comfortable for a general adult audience, Ms. Betsy Price and Ms. Mary McDonald who have extensive educational experience working with the general adult audience, will review each script.

Working closely with Media Solutions, the producers for KULC's *Science Without Walls* series and *Slice of Life*, appropriate video segments will be identified for 60-90% of the script. A shooting and acquisition list and schedule will be made. Working with our existing, extensive video library – including the 20 hours of *Science Without Walls* – and with video materials and suggestions provided by our clinical and technical colleagues, including the Fellows of the American Institute for Medical and Biological Engineering (AIMBE), we will select, acquire, and implement the needed broadcast quality video. Perhaps 25% of the video needed will be shot in local hospitals, clinics, and biology/physiology labs by the Media Solutions team in close cooperation with the project technical and education staff. The script will then be revised to reflect the available video, and then the studio shooting of the host-narrator will be obtained.

The sustainability of the project is strengthened by the media format chosen. The complementary web site allows for updated information to be available in a rapid fashion so that new ideas can be added to complement the core video material. The proposal seeks to expend much of its energy and resources in the startup and development of the materials. Once these are in place, they can be maintained with much less effort. The interest on a national level in this kind of program and information content from groups such as the Whitaker Foundation, the National Science Foundation, and associated professional societies related to medicine and technology will help to provide a steady flow of resources and individuals who will facilitate bringing this kind of program from a regional to a national level. The promotion and public relations components of the University of Utah and the Center for Integrated Science Education will be able to promote and distribute the materials on a sustaining basis.

The budget will cover development of nearly half of the total project with matching funds expected from the University of Utah and the State of Utah. The majority of the budget expenditures is for the video production of the telecourse material with University of Utah Media Solutions group. Broadcasting expenses after development are minimal. We expect to complete the first half of this two part program so that broadcasting can commence in late 1999. The second half of the project will follow in parallel with an expected implementation in early 2000.

We are requesting \$250,000 in state matching funds in a competitive proposal to the Utah System of Higher Education Technology and Distance Education Initiative for 1996/1997. That proposal was submitted by invitation on April 4, 1997 with a funding decision to be announced by June 15, 1997 and a start date of July 1, 1997. Utah's Governor is a strong advocate of modern electronic and telecommunication technologies which has resulted in a statewide commitment to fund telecommunications projects such as *Medicine and Measurement*. Federal support is needed to fully support the project in

remote communities where there is the greatest need for better access to health care education. This goes beyond the capability of the University and Utah System of Higher Education.

Implementation Schedule/Timeline

- 7/97: State Higher Education matching funds would be available. Front end evaluation; survey of high schools and college students for previous content knowledge about medical measurement. Extensive summer effort to outline and plan all 30 programs and initiate scripting for Programs 1-6.
- 10/97: Clinical and basic science review teams in place; review and revise scripts 1-6. Video scheduling for scripts 1-6. Drafts of scripts 7-12 completed.
- 12/97: Review and revisions of scripts 7-12; drafts of scripts 13-15; video scheduling for scripts 7-12.
- 3/98: Field shooting for Programs 1-6 begins; drafts for Programs 16-18 completed; review begins; revised scripts for 13-15.
- 6/98: Prepare for initial teacher workshop Labless and Briefcase Labs for 1-15 completed; field shooting for Programs 7-15 begins. Field-test Briefcase Labs; revision.
- 10/98: Drafts of 19-24 completed; review begins; revised scripts of 16-18 finished; field shooting and video selection of 1-15 finished; scripts 1-15 revised in accordance with video and availability, studio work begins on 1-15. Present to focus group.
- 12/98: Studio shooting 1-15 finished; first half completed! Merry Christmas! Drafts of 25-27 finished, review begins. Final drafts of 19-24 finished; field shooting of 16-24 begins.
- 3/99: Test broadcast of Course 1, Programs 1-15. Drafts of 28-30 finished, review begins. Final drafts of 25-27. Field shooting of 25-30. Studio shooting of 16-20.
- 6/99: Final drafts of 28-30; studio shooting of 21-30 complete. Programs 16-30 finished - Alleluia! Prepare for Lab Workshop #2 for 1-15. Prepare for Lab Workshop #1 for 16-30. Evaluation of Programs 1-15.
- 9/99: Workshops complete. Revise labs. Test broadcast of Course 2 Programs 16-30. Preliminary evaluation of Programs 16-30. TIIAP Project completed.
- 12/99: Final evaluation and assessment continues with state funds or via no cost extension.

3. Community Involvement

Partnerships:

Media Solutions, the production arm of KULC, will work closely with the PI's and their team to produce the video segments of *Medicine and Measurement*. KULC is Utah's prime instructional television station. By providing quality instructional programs and services to all ages, KULC is valued as an educational resource statewide. In the creation of CD-ROM based materials for this course, we will collaborate with Media Solutions who produced the *Slice of Life* project at the University of Utah. Their primary focus in health sciences education is to produce and distribute videodiscs, CD-ROMs and interactive computer software programs.

The *Natural History of Genes* is a joint project between the Eccles Genetics Institute, School of Medicine, and Utah Museum of Natural History. As Project Director, Betsy Price has agreed to share her statewide teaching infrastructure and resources with us. Her experience doing public education programs in the remote areas of the region will assist us in reaching adult populations including the Native Americans. Through the Natural History of Genes project we will link into their existing web site and learn from their interactive web experiences.

Brett Moulding, Science Specialist at the Utah State Office of Education, will assist in teacher involvement at the regional learning centers. Through his statewide experiences, he is able to identify key teachers to serve as Master Mentors in their communities. He will be instrumental in establishing credit and possibly endorsements for the teachers who are involved in *Medicine and Measurement*. Mr. Moulding will be able to assist us in obtaining additional funds to provide teachers compensation for the professional development workshops they will need to complete as Master Mentors.

Other partners include the clinical medicine/health care community, particularly Intermountain Health Care, a local health maintenance organization. A network in the form of duplicate video tapes of specific materials with complementary access to the web site for user support, or the creation of CD-ROM based media that incorporates the programs and some of the hands on laboratory information into one package will allow us to reach users of the health care system. We will also work with the Utah Science Teachers Association, the Utah Museum Network, the State System of Higher Education, and the Utah Library Association for additional outlets and increased accessibility to the interactive media.

4. Reducing Disparities

The key disparity we address is a rural and geographically distributed population with limited access to current health care materials, resources, and education. Over 80% of the state's population lives in a small, urbanized area of the state. The remaining 20% is scattered throughout very small towns that are often separated by impassable terrain and require hours of driving to reach.

The beauty and potential of the statewide telecommunications technologies is that practically all segments of the population, all geographic regions, can be readily served, because the television receiver is nearly ubiquitous in our society. There are very few segments of the population without access to television. Internet accessibility is increasing as well in all regions of our state thereby providing remote areas and smaller communities with the means to access information.

We will use local clinics and high schools as regional learning sites in these communities. High school teachers acting as "Master Mentors" will assist in promoting and increasing accessibility for *Medicine and Measurement* at these sites. Collaboration with the local Intermountain Health Care facility in their region will further provide a mechanism for the series to be viewed locally.

5. Evaluation and Dissemination

Betsy Price, M.A., Ph.D. candidate, will work closely with Mary McDonald from the Center for Integrated Science Education in developing, implementing, and analyzing the assessment measures for *Medicine and Measurement*. Ms. Price is the Project Director for the *Natural History of Genes*, a program involving the Eccles Genetics Institute, School of Medicine, and Utah Museum of Natural History. She will draw from her experiences working with health care professionals, studying learning in informal environments, and doing assessment and evaluation to determine our effectiveness in meeting our goals.

The evaluative methodology will be to establish a control group who will represent adults who have not attended college. Since biology is likely to be the last formal science course for non-college bound adults, we will set up this group to include students from

rural and urban high school biology classes and college/university first biology classes. They will be surveyed for their conceptual knowledge about general science; their ability to apply science concepts to medical measurements; and their ability to interpret the results of medical measurement.

Another group will be set up to include participants who complete the *Medicine and Measurement* series. They will be randomly surveyed and the results will be compared to the control group to determine:

- Does the program attract persons who would not ordinarily take a "traditional" course?
- Are they better informed about medical measurement than the control groups?

Another group will include adults who are exposed to segments of *Medicine and Measurement* at the Intermountain Health Care centers or at regional learning centers. This group will be used to assess the effectiveness in reaching a diverse adult population, the ability to better understand their health care, and their accessibility of the technology. We will use random surveys to a list of names of adults who are pre-selected through visits to the Intermountain Health Care centers.

In our overall analysis, we will determine if we have met our intended outcomes:

- Has the method of delivery been successful to reach adults from a broad demographic range of age, interests, cultural groups, and educational levels?
- Has the pedagogy and teaching styles been successful in educating people who would, or could not, attend a "traditional course?"

Once the analysis is complete, a report will be compiled and be made available to others who are promoting telecommunications to reach adult populations who are no longer in a formal school system. This will require promoting the project results through articles in various professional journals, through a page on the web site, and through presentations at the Visitors Learning Conference and the American Association for Museums.

To reach diverse audiences and special interest groups we plan to disseminate information about the program through the media resources of the Center for Integrated Science Education's web site, the Parent Teachers Association's publications, and the State Board of Education's publications to science and health teachers. We will also make presentations at the Rural School Association and the National Science Teachers Association. We will send out public service announcements about the television series to radio stations like KRCL, a community radio station that serves the ethnic communities in urban and rural areas of the region.

Overall Project Budget

July 1, 1997 to June 30, 1999

	<u>TIIAP</u>	<u>Utah Higher Ed.</u>	<u>U. of Utah</u>	<u>TOTAL</u>
Personnel				
Andrade, PI	5,000	3,500	25,000	33,500
Kern, Co-PI	15,000	15,000		30,000
Horch	5,000		13,000	18,000
Pantalos	5,000			5,000
McDonald	15,000	7,500		22,500
Price	10,000			10,000
Kaczka	5,000	5,000		10,000
Grad/Med Students	10,000	5,000		15,000
Undergrad Students	10,000			10,000
Total Salary Costs	80,000	36,000	38,000	154,000
Fringe Benefits				
Fac.-staff @ 33%	19,800	10,230	12,540	42,570
Students @ 9%	1,800	450	0	2,250
Travel				
Conferences	2,000		500	2,500
Site development	2,000		500	2,500
Equipment				
Laptop computer	3,500			3,500
Projection	1,000			1,000
Net Server	5,500			5,500
Supplies				
Office	8,000	7,000		15,000
Labless Lab	5,000			5,000
Briefcase Lab		25,000		25,000
Contract				
Media Solutions	150,000	150,000		300,000
Other				
Telephone		500	500	1,000
Copyright fees	15,000	10,000		25,000
Teacher consultants/ training		10,000		10,000
TOTAL DIRECT COSTS	293,600	249,180	52,040	594,820
TOTAL INDIRECT COSTS @ 34.1% OF MITDC	96,708	84,970	17,746	199,424
TOTAL COSTS	390,308	334,150	69,786	794,244
Percent of total project costs:	49.1%	42.1%	8.8%	100.0%

Budget Narrative

Personnel:

Project Director, J.D. Andrade, will oversee all aspects of the project; will see that budgets, time tables, and deliverables are all met, including scripts, labs, video selection, etc., will prepare reports and presentations, will work closely with all team members, advisors, and consultants, etc. He will devote at least 25% time for the two years of the project. His annual salary is \$70,000/year – cost to project is \$33,500:

Federal: \$ 5,000 Match: \$28,500 Total: \$33,500

Project Co-Director, S. Kern, will work closely with Andrade on all aspects of the project. He will be particularly responsible for the development of the laboratory components, including the Labless Lab and the Briefcase Lab and for the segments of the video programs and the course materials that deal specifically with these laboratories. As a professor in the Department of Anesthesiology and the College of Medicine, he will have the lead role in putting together the clinical medicine and basic physiology/biology advisory teams for each program topic in this project. He will also work closely with his bioengineering and clinical colleagues throughout the country and particularly with the American Institute for Medical and Biological Engineering to obtain suitable input and resources from professionals throughout the nation. Dr. Kern will devote about one third of his time for the two years of the project. His annual salary is about \$45,000/year – cost to project is \$30,000

Federal: \$15,000 Match: \$15,000 Total: \$30,000

K. Horch is Professor of Physiology and Professor of Bioengineering and teaches a range of quantitative physiology laboratories and biomedical instrumentation laboratories. He has a deep and long interest in effective education at both the graduate and undergraduate level. He will devote about 11% of his time to this project. His annual salary is \$82,000 – cost to project is \$18,000:

Federal: \$5,000 Match: \$13,000 Total: \$18,000

G. Pantalos is an accomplished bio and mechanical engineer with considerable teaching experiences as well as extensive research experience in the artificial heart and cardiac assist program at the University of Utah. He too will devote about 11% of his time to this project. His annual salary is \$82,000 – cost to project is \$5,000:

Federal: \$5,000 Match: 0 Total: \$5,000

M. McDonald is a science educator who administers the Center for Integrated Science Education. She has extensive experience in informal science education and working on inservice training for teachers at both the elementary and junior high school levels. She has particular skills in the development of course and curriculum materials and was a key participant in the *Science Without Walls* telecourse project. Mary's annual salary is \$32,000/year. She will devote about 35% effort to the project over the two year period. Cost to project: \$22,500

Federal: \$15,000 Match: \$7,500 Total: \$22,500

B. Price has a Ph.D. in science education, extensive experience in informal science education, and has recently served as project manager for the Natural History of Genes Project, a unique collaboration between the Hughes Institute of Genetics, the College of Medicine, and the Utah

Museum of Natural History. Betsy's experience in the development of hands on interactive experiences for a range of age and experience levels is very important. She has extensive experience in assessment and evaluation and will be responsible for those activities in this project. Betsy will devote 12-15% of her time on this project over the two year period. Her annual salary is \$30,000 – cost to project: \$10,000

Federal: \$10,000 Match: 0 Total: \$10,000

Other: The other entries in the budget page are primarily secretarial support, and very limited stipends and compensations for graduate students, medical students, and undergraduate students to assist in the development and testing of the various demonstrations and the laboratory experiences. They will work closely with Steve Kern and Ken Horch in the development of the various labs, as well as closely with Joe Andrade, Ken Horch, and George Pantalos in researching the materials needed for scripts and technical content.

Fringe Benefits: The University of Utah's average fringe benefit rate is 33%. This general figure has been applied.

Travel: \$2,000 are requested of Federal funds for site development, primarily to work with the regional learning centers and Intermountain Health Care clinics. Most of the travel will be by Mary McDonald, Betsy Price, and Steve Kern. Utah is a very large state and the Intermountain West is even larger. Much travel requires overnight stays.

Travel to conferences is also requested. This will be utilized primarily in the second year of the project as part of the extensive national dissemination activities. The team would travel to at least two major conferences during the two years of the grant: one largely focused on distance education and continuing education and the other largely focused on informal science education. The latter would likely be the Association of Science and Technology Center's annual meeting.

Equipment: The goal of this project is to use existing telecommunications and technology infrastructure; nevertheless some limited equipment is needed. We have budgeted a fast, high memory, sophisticated lap top system which will enable presentation and demonstration of the project in the field. This will be utilized with existing VHS/VCR equipment. In addition a work station net server system will be established through the Departments of Engineering and Anesthesiology to support the extensive web site which will be developed for this project. To maintain and launch the World Wide Web Site, we will purchase a personal computer equipped with a 200 MHz pentium processor, 32 Mbytes of RAM, 4.2 Gbyte hard drive and 17 inch color monitor to be the web site server. This will allow adequate capability for program storage, maintenance of course material, and monitoring of web site access to evaluate the frequency of access and statistics important for assessing the usefulness of the site. Total equipment funds requested are \$10,000, all of that Federal.

General Office Supplies: These are budgeted at very roughly \$500/program segment for a total \$15,000, split between Federal and matching. These generic office supplies include the materials required for script development. That would include inter-library loan reference and related resource materials as well as photo copying and graphics supplies. It would also include the appropriate materials for assessment and evaluation of the program.

\$5,000 is budgeted for Labless Lab development – all of that Federal. We already have an existing Labless Lab for the *Science Without Walls* course; it requires simple modification and enhancement for this program.

The Briefcase lab, however, is a much more extensive development. Because that will be primarily used for course related activities at the University of Utah, at least in the initial years, we have budgeted all of that through the state matching funds: \$25,000. None of it is budgeted through the Federal account.

Contract: Media Solutions is a local group affiliated with our PBS television channel, Channel 7, as well as with KULC, The Learning Channel, Channel 9. This is a statewide channel for the delivery of educational materials. We have worked closely with Media Solutions in the development of the *Science Without Walls* telecourse. This project is much more extensive and expensive. We have budgeted approximately \$10,000 per one hour segment for production costs. That is only about \$200 per finished minute, which is an incredibly low rate for professional video production. We have allocated half to the Federal fund: \$150,000, and half to state funds: \$150,000. We are also showing \$140,000 indirect cost match. Media Solutions would normally charge a \$500-\$1000 per hour rate or higher for off campus commercial projects.

Other: We have budgeted copyright fees to enable the extensive national distribution of these materials: \$15,000 budgeted to Federal, \$10,000 to match.

Teacher consultants/trainees refers to the high school teachers who will be especially involved and trained to conduct the Briefcase laboratories at the regional learning centers. Again this largely focused on the University's implementation of the project. Thus, these costs have been allocated to the state portion of the budget.

Indirect Costs: The University's indirect cost rate is 34.1% for training and education projects. The indirect costs portion of the state contract are considered a University of Utah match, so indicated.

We do realize that a project of this magnitude could be very difficult to complete with only the \$800,000 total budget itemized here, of which \$393,718 are requested from the TIIAP program (49.4% of project total). We are hopeful, however, that with these funds in hand, we will be successful in securing additional foundation and other agency support to assist with specific components of the project, such as the Labless Lab and Briefcase Lab development and the high school teacher training component. We are approaching the National Science Foundation's Teacher Enhancement program for a portion of those funds.

A Science Telecourse!

From the University of Utah

Liberal Education 144

Science Without Walls: Science in *Your* World

(5 credit hours)

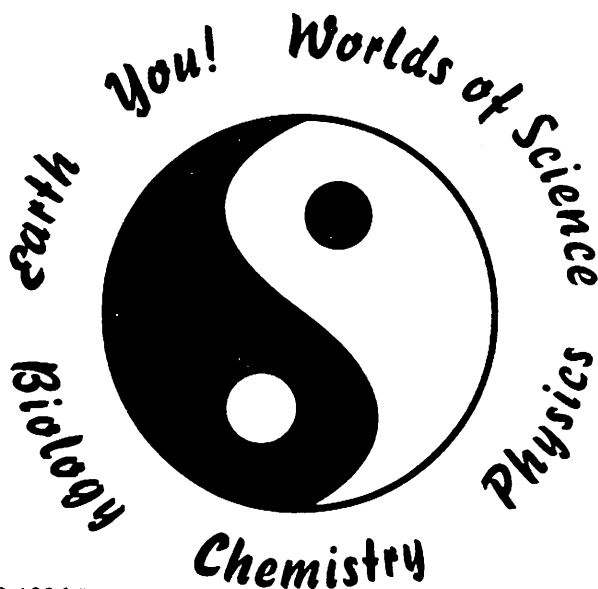
Channel 9, KULC

Monday, Wednesday 9-10 p.m.

Beginning March 31, 1997

Science Without Walls is a concept- and inquiry-based course which focuses on major science concepts, applicable to all areas of science. The course is intentionally multi- and interdisciplinary and designed primarily for non-science majors. It will connect science to daily life and activities. Connections between science and art are particularly stressed.

There are six parts to the course: the first deals with the processes and the experimental nature of science and its connections with the arts. The second deals with physics, the third with chemistry, the next part with biology. The fifth applies the first four to nature, the environment, and environmental issues. The concluding programs involve discussions and experiments as to how science relates to your everyday life, empowering you to be an even more responsible, involved citizen and resident.



Science Without Walls satisfies the Liberal Education core science requirement. Although designed primarily for university undergraduates, the course is of great benefit and interest to all in the Channel 9 viewing area.

Course materials include several paperback textbooks, a comprehensive syllabus, and a unique Labless Lab kit of experiments.

For registration information contact the Telecourse Office in the Division of Continuing Education at (801) 581-5752.

Table 1: First 15 Programs - Measurement and Physiology: Are you normal?

Week	Section Structure	Lecture Title	Companion Lab H = home lab B= briefcase lab
1	Introductory	You're Abnormal	Temperature measurement (H)
2		You're Imperfect	Morphometry (H)
3		Lies and Electrons	Body impedance / fat (B)
4	Energy	More Power to you	Urinalysis (H)
5		Hiking, Diving, Running	Pco ₂ (H)
6		Can't even break even	Basal Metabolism (B)
7	Delivery	Hot stuff - warm blood	Blood pressure (H)
8		Body electric	Heart rate (H)
9		Body magnetic	Electrocardiography (B)
10	Consumption	Gravity wins	Reaction time (H)
11		Newton rules biology	Muscle fatigue (H)
12		Where did the energy go	Emg / Eeg (B)
13	Sensation	Senses and sensibility	Tactile senses (H)
14		Photon world	Taste (H)
15		Summary	Vision / Auditory experiments (B)

Table 2: Programs 16-30 - Measurement, Pathology, and Medicine: You are abnormal.

Week	Section Structure	Lecture Title	Companion Lab H = home lab B= briefcase lab
16	Introductory	You're even more abnormal	Home cultures (H)
17		Multiplying and killing cells	Family Ailment Tree (H)
18		Its your parents fault	Natural History of Genes (B)
19	Energy	Problem babies	Prenatal Care Assessment (H)
20		Diabetes/Metabolism	Glucose Tolerance Computer Prog(H)
21		Cystic Fibrosis/O ₂ delivery	Work of Breathing (B)
22	Delivery	Hypertension	Medically managing Grandma (H)
23		Hopeless organs	Control of Heart Computer Prog (H)
24		Artificial organs	Benchtop Dialysis (B)
25	Consumption	Old bones and joints	Chicken bone mechanics (H)
26		MS/Lou Gehrig's Disease	Nerve Physiology Computer Prog(H)
27		Nerves and brains	Virtual Neurosurgery (B)
28	Sensation	New eyes and ears	Radial Keratotomy / Miracle ears (H)
29		Biohybrid devices	Artificial skins (H)
30		Summary	Clinical Case Solving (B)