A SCIENTIFIC FRAMEWORK pdf

1: A Scientific Framework to Qualify Biomarkers as Primary Endpoints Recommended

Understanding Science conceptual framework. This list of conceptual understandings regarding the nature and process of science is aligned across grade levels to help instructors identify age-appropriate learning goals for their students and understand how concepts taught at one grade level lay the groundwork for more sophisticated concepts later on.

Mixed-Methods Research, Choosing a Method A simple experimental design entails comparing two randomly assigned groups within a sample population. There are three forms of survey validity, including content, concurrent, and construct validity Creswell, Construct validity is the most prevalently used measure for survey validity Creswell, To be considered content valid, a survey must measure what it claims to measure. Concurrent validity refers to an instrument correlating with the results of an established survey, and construct validity refers to whether the individual questions have been confirmed to measure specific constructs cognitive traits. Take the construct of passion for example. The passion scale was developed using exploratory and confirmatory factor analysis to establish the factors underlying the passion construct and to create a tool for detecting them Vallerand et al. In establishing the construct validity, a survey is confirmed as being valid to measure a specific construct, such as passion. If a survey does not measure the same way each time, the results obtained would not be reliable. The score eliminates the need to obtain multiple samples to establish reliability of a survey Cronbach, The conventionally accepted threshold is a score of. Keep in mind that doctoral students performing survey research typically use statistical software packages, such as SPSS, to perform validity and reliability tests for surveys. In addition to survey validity and reliability, the sampling design is integral to the validity of the results. Sampling refers to selecting a sample of participants from a larger population. Although there are many sampling designs, random, stratified, and convenience are three common approaches. These sampling designs lie on a spectrum from random to nonrandom selection. For example, in the target population of undergraduate students at a given university, a random sample would give all enrolled undergraduate students at that university an equal chance of being part of the sample group. Suppose a researcher was only interested in male sophomore students. This would be a stratified sample, selected by gender and college level. A convenience sample would be needed if only a portion of the students had publicly accessible e-mails. It would not be random or randomly stratified, but merely based upon conveniently available participants. Lastly, there are many factors to consider in determining a sufficient sample size. In effect, the larger the sample the more likely it will be representative of the larger population. Response rate is one consideration. Not every person sent a survey will complete it. Fowler offers a good discussion of conventional and formulaic means of determining an appropriate sample size. Experimental Research Experimental research is the most reliable method for determining causal relationships, but as Pearl explained, the idea of cause and effect were not central, or even desirable, components of initial conceptions of quantitative research. Correlation refers to the degree of relationship between two or more variables Freedman et al. Correlation does not imply that cause and effect exists between variables; it simply indicates a relationship exists between two or more variables. For example, a researcher might determine that college-level junior, senior, etc. Now it would seem strange to say that being a junior versus being a sophomore causes a higher GPA, but a person could suppose that maturity, study skills, and consistent preparation in some way cause a higher GPA. To determine the cause of increased GPA, one might design an experiment. A simple experimental design entails comparing two randomly assigned groups within a sample population. One rigorous version of this design is called a random controlled trial Freedman et al. A seminal, although imperfect, example of this technique is the Salk polio vaccine field trials of the s Freedman et al. In a simple experimental design, one group is the control, which means this group does not receive any stimulus, and one group is the intervention, which means this group receives a testable stimulus. Within experimental research, the researcher endeavors to eliminate threats to validity, or factors that might interfere with determining an observed change in the intervention group when compared to the control group. This model strives to eliminate merely chance causes for an effect. The first is the establishment of internal validity, and the second is the establishment of external validity. Generalizing the results is known as external validity. As

Cartwright stated, generalizing the results to different populations is not an easy task, as it requires taking into account nearly perfect alignment of population characteristics, including contextual and situational variables. For example, one threat to external validity is selection bias Wiersma, Selection bias refers to researchers using personal preference to select and assign participants to control and intervention groups. This introduction of human bias in assignment decreases external validity. As such, there is a need to remedy this threat. The experimental design presented in this chapter is simplistic in form. In designing more advanced experiments, there are several items to consider. For example, if it is not possible or preferable to assign participants to groups randomly, this would be considered a quasiexperimental design Creswell, Other more advanced experimental designs might include observing a single subject over time, a pre-posttest configuration, and multiple control and intervention groups with an arrayed pre-posttest configuration. Creswell offers an accessible treatment of these more advanced experiments. Qualitative Research Qualitative research primarily entails the analysis of symbols to explain human experience and interaction. The reason for this is that qualitative research focuses on individuals or groups of individuals, and people use symbols to describe contexts and situations. The constructivist paradigm might be useful here to explain the scope of qualitative research. If knowledge is constructed socially, and if knowledge creation is about meaning making and is affected substantially by social interaction, then there is a need for an expansive description to define the phenomena of inquiry. As Ponterotto explained, the term thick description has come to define the way qualitative researchers acquire and explain knowledge about social interaction. Only through observing the thoughts, feelings, and entire context of experience does the qualitative researcher capture such a thick description of reality. A thick description is used in qualitative research to obtain a holistic or extensively detailed expression of a context or situation. Describing an apple on a table is a thin description. Exclaiming that there is an apple on a table does not capture qualities such as why the observer was there, how those items came to be where they were observed, or where the room was located, such as in a specific house, in a specific geographic location. A thick description would include all of these qualities. There are a variety of ways qualitative researchers use a thick description to inquire about phenomena. The main approaches include ethnography, phenomenology, case study, narrative, and grounded theory. Phenomenology In phenomenological research, researchers inquire about the unique thoughts, feelings, and experiences that help describe people within situations van Manen, For example, both researchers and sample participants might want to know about the experience of traveling to work. Do commuters get frustrated when it takes longer than usual to travel to work? How does a person travel to work? The lived experience of traveling to work in this way can be viewed as unique to an individual, with a unique means of transportation, unique route driven, or unique experience of actually driving in an automobile, such as sitting in front of steering wheel and steering. To explore these phenomena, a researcher might observe people traveling to work, interview one or more individuals found to travel to work, or write down thoughts in a field journal, expressing personal reflections of observing and interviewing these people. In each of these examples, the focus is on unique lived experience, and the lived experience is not only the person traveling to work but also the researcher inquiring about such practices. Case Study Whereas an ethnographic study aims at discovering cultural artifacts and a phenomenological study focuses on individual lived experience, a case study examines time sensitive activities that have explicit and tacit rules that affect human experience and interaction. Case studies are time and activity dependent, which means a case study explores a set of activities within a particular time frame Creswell, As with other qualitative approaches, the researcher could utilize artifacts, interviews, and observations to explain a particular case, or series of cases. In addition, focus groups and surveys with open-ended questions are often used to collect information from participants. Although numerical surveys are not often used in qualitative research, descriptive information might be collected in a case study to aggregate demographic information about participants, such as the total number of participants, average age, or gender percentages. Although case studies typically include interviews with participants, such interviews might only tell part of the story, or confirm the story a researcher expects to find. Narrative In narrative research, the focus is on telling the narrative life stories of participants. This type of inquiry entails expressing the constantly changing but meaningful experience of people. Whereas a case study has well-defined parameters, such as being time and activity dependent, narrative research tells a story that may not necessarily have such parameters or restrictions. Connelly and Clandinin offered a framework for how this might be implemented. A narrative researcher attempts to realize and embrace the idea that experiences only become isolated when reflected upon. Narrative research then uses interviews, artifacts, and researcher observations, as co-participants in the inquiry, to help tell life stories. Connelly and Clandinin offered the example of teacher knowledge. Their example demonstrated how two groups of specific teachers obtained, retained, and expressed the knowledge they used as teachers. Narrative research can be a useful tool to reflect on experiences in particular contexts, with the realization that the retelling of stories creates a new story in and of itself. In this way, narrative research can be transformative. Grounded Theory In contrast, a grounded-theory approach focuses less on transformation and more on reducing the effect of preconceived notions in the research activity. As the term implies, grounded theory builds or discovers theory from the ground up, not by imposing theory on participants. This approach views all encountered data as possibly useful to an emerging understanding of the topic being researched. This differs significantly from quantitative research, which has a specific focus, and most qualitative approaches, which at least use a literature review to establish a theoretical framework. As previously stated, a literature review is an efficient way of determining the right questions to ask. In grounded theory, the right questions emerge from encountering data in the field. No preconceived theory is imposed on grounded-theory data. Instead of seeking out other studies completed on a topic, a grounded-theory researcher may interview and observe participants to generate themes, examine artifacts, or perform content analysis of written texts, which involves analyzing idea or word frequency in written material. The researcher then interprets the collected data to create a theoretical framework. In effect, grounded theory is an inductive approach to inquiry, because it creates propositions based upon exemplars found in experience. Its approach to provisionally acknowledging all found data as valuable intersects with the approach employed by mixed-method researchers. Mixed -Methods Research A mixed-method researcher may utilize both quantitative and qualitative methods to obtain knowledge. In one sense, exploring mixed-method approaches brings this chapter full circle, because using a mixture of methods is the way people inquire in everyday life. People use numbers, observed phenomena, and information from others to make decisions.

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2: Scientific Framework â€“ The GC Index

Scientific Framework The GC IndexÂ® was created by Nathan Ott, Chief Polisher, and Dr John Mervyn-Smith, Chief Psychologist, in collaboration with Management Expert, Professor Adrian Furnham, following The DNA of a Game Changer Study.

Bibliography Definition Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists. Theory Building in Applied Disciplines. Importance of Theory A theoretical framework consists of concepts and, together with their definitions and reference to relevant scholarly literature, existing theory that is used for your particular study. The theoretical framework must demonstrate an understanding of theories and concepts that are relevant to the topic of your research paper and that relate to the broader areas of knowledge being considered. The theoretical framework is most often not something readily found within the literature. You must review course readings and pertinent research studies for theories and analytic models that are relevant to the research problem you are investigating. The selection of a theory should depend on its appropriateness, ease of application, and explanatory power. The theoretical framework strengthens the study in the following ways: The theoretical framework connects the researcher to existing knowledge. Guided by a relevant theory, you are given a basis for your hypotheses and choice of research methods. Articulating the theoretical assumptions of a research study forces you to address questions of why and how. It permits you to intellectually transition from simply describing a phenomenon you have observed to generalizing about various aspects of that phenomenon. Having a theory helps you identify the limits to those generalizations. A theoretical framework specifies which key variables influence a phenomenon of interest and highlights the need to examine how those key variables might differ and under what circumstances. By virtue of its applicative nature, good theory in the social sciences is of value precisely because it fulfills one primary purpose: Answers from the Social and Cultural Sciences. University of Tennessee Press, ; Drafting an Argument. How Conceptual Frameworks Guide Research. Research Methods Knowledge Base. Developing Theory from Practice. Strategies for Developing the Theoretical Framework I. Developing the Framework Here are some strategies to develop of an effective theoretical framework: Examine your thesis title and research problem. The research problem anchors your entire study and forms the basis from which you construct your theoretical framework. Brainstorm about what you consider to be the key variables in your research. Answer the question, "What factors contribute to the presumed effect? Identify the assumptions from which the author s addressed the problem. Group these variables into independent and dependent categories. Review key social science theories that are introduced to you in your course readings and choose the theory that can best explain the relationships between the key variables in your study [note the Writing Tip on this page]. Discuss the assumptions or propositions of this theory and point out their relevance to your research. A theoretical framework is used to limit the scope of the relevant data by focusing on specific variables and defining the specific viewpoint [framework] that the researcher will take in analyzing and interpreting the data to be gathered. It also facilitates the understanding of concepts and variables according to given definitions and builds new knowledge by validating or challenging theoretical assumptions. Purpose Think of theories as the conceptual basis for understanding, analyzing, and designing ways to investigate relationships within social systems. To that end, the following roles served by a theory can help guide the development of your framework. Means by which new research data can be interpreted and coded for future use, Response to new problems that have no previously identified solutions strategy, Means for identifying and defining research problems, Means for prescribing or evaluating solutions to research problems, Ways of discerning certain facts among the accumulated knowledge that are important and which facts are not, Means of giving old data new interpretations and new meaning, Means by which to identify important new issues and prescribe the most critical research questions that need to be answered to maximize understanding of the issue, Means of providing members of a professional discipline with a common language and a frame of reference for defining the boundaries of their profession, and Means to guide and inform research so that it can, in turn, guide research efforts and improve professional practice. Holton III , editors. Human Resource Development Handbook: Linking Research and Practice. Theory Construction and Model-Building Skills: A Practical Guide for Social Scientists. Guilford, ; Ravitch, Sharon M. Structure and Writing Style The theoretical framework may be rooted in a specific theory, in which case, your work is expected to test the validity of that existing theory in relation to specific events, issues, or phenomena. Many social science research papers fit into this rubric. For example, Peripheral Realism Theory, which categorizes perceived differences among nation-states as those that give orders, those that obey, and those that rebel, could be used as a means for understanding conflicted relationships among countries in Africa. A test of this theory could be the following: Does Peripheral Realism Theory help explain intra-state actions, such as, the disputed split between southern and northern Sudan that led to the creation of two nations? However, you may not always be asked by your professor to test a specific theory in your paper, but to develop your own framework from which your analysis of the research problem is derived. Based upon the above example, it is perhaps easiest to understand the nature and function of a theoretical framework if it is viewed as an answer to two basic questions: I could choose instead to test Instrumentalist or Circumstantialists models developed among ethnic conflict theorists that rely upon socio-economic-political factors to explain individual-state relations and to apply this theoretical model to periods of war between nations]. The answers to these questions come from a thorough review of the literature and your course readings [summarized and analyzed in the next section of your paper] and the gaps in the research that emerge from the review process. With this in mind, a complete theoretical framework will likely not emerge until after you have completed a thorough review of the literature. Just as a research problem in your paper requires contextualization and background information, a theory requires a framework for understanding its application to the topic being investigated. When writing and revising this part of your research paper, keep in mind the following: Clearly describe the framework, concepts, models, or specific theories that underpin your study. This includes noting who the key theorists are in the field who have conducted research on the problem you are investigating and, when necessary, the historical context that supports the formulation of that theory. This latter element is particularly important if the theory is relatively unknown or it is borrowed from another discipline. Position your theoretical framework within a broader context of related frameworks, concepts, models, or theories. As noted in the example above, there will likely be several concepts, theories, or models that can be used to help develop a framework for understanding the research problem. The present tense is used when writing about theory. Although the past tense can be used to describe the history of a theory or the role of key theorists, the construction of your theoretical framework is happening now. You should make your theoretical assumptions as explicit as possible. Later, your discussion of methodology should be linked back to this theoretical framework. Alabama State University; Conceptual Framework: University of Michigan; Drafting an Argument. Demystifying the Journal Article. The Context of Discovery. Stanford University Press, , pp. Writing Tip Borrowing Theoretical Constructs from Elsewhere A growing and increasingly important trend in the social and behavioral sciences is to think about and attempt to understand specific research problems from an interdisciplinary perspective. One way to do this is to not rely exclusively on the theories in your particular discipline, but to think about how an issue might be informed by theories developed in other disciplines. For example, if you are a political science student studying the rhetorical strategies used by female incumbents in state legislature campaigns, theories about the use of language could be derived, not only from political science, but linguistics, communication studies, philosophy, psychology, and, in this particular case, feminist studies. Building theoretical frameworks based on the postulates and hypotheses developed in other disciplinary contexts can be both enlightening and an effective way to be fully engaged in the research topic. The Oxford Handbook of Interdisciplinarity. Oxford University Press, Do not leave the theory hanging out there in the introduction never to be mentioned again. Undertheorizing weakens your paper. The theoretical framework you describe should guide your study throughout the paper. Be sure to always connect theory to the review of pertinent literature and to explain in the discussion part of your paper how the theoretical framework you chose supports analysis of the research problem, or if appropriate, how the theoretical framework was found in some way to be inadequate in explaining the phenomenon you were investigating. The terms theory and hypothesis are often used interchangeably in newspapers and popular magazines and in non-academic settings. However, the difference between theory and hypothesis in scholarly research is important, particularly when using an experimental design. A theory is a well-established principle that has been developed to explain some aspect of the natural world. Theories arise from repeated observation and testing and incorporates facts, laws, predictions, and tested assumptions that are widely accepted [e. A hypothesis is a specific, testable prediction about what you expect to happen in your study. For example, an experiment designed to look at the relationship between study habits and test anxiety might have a hypothesis that states, "We predict that students with better study habits will suffer less test anxiety. The key distinctions are: A theory has been extensively tested and is generally accepted among scholars; a hypothesis is a speculative guess that has yet to be tested.

3: Chapter 5 Framework of Scientific Research

A scientific framework also provides consistency to the planning and management process through time and staff changes. An Example On 14 March , voters in Broward County, Florida, approved a $75 million bond issue referendum to acquire and manage environmentally sensitive lands (ESLs).

National Cancer Institute published an important overview of the state of the science and medicine of pancreatic cancer. We will comment on aspects of it from time to time in the future, but as it so comprehensive and precise, in a departure from our usual practice, we will show a copy it here sans bibliography and figures in our pancreatic cancer blog. Scientific Framework for Pancreatic Ductal Carcinoma Executive Summary Significant scientific progress has been made in the last decade in understanding the biology and natural history of pancreatic ductal adenocarcinoma PDAC, pancreatic cancer ; major clinical advances, however, have not occurred. Although PDAC pancreatic cancer shares some of the characteristics of other solid malignancies, such as mutations affecting common signaling pathways, tumor heterogeneity, development of invasive malignancy from precursor lesions, inherited forms of the disease, and common environmental risk factors, there are unique obstacles that have made progress against PDAC pancreatic cancer difficult. Consensus within the scientific community regarding the limited early diagnostic or therapeutic approaches for patients with PDAC pancreatic cancer has provided a stimulus for the evaluation of new and missed opportunities that could now be applied to the existing portfolio of PDAC pancreatic cancer research in order to make more substantial progress. The current state of knowledge in PDAC pancreatic cancer research, including epidemiology, risk assessment, pathology, screening, early detection, and therapeutic research was evaluated by an expert panel of extramural scientists that helped the NCI identify and prioritize new scientific ideas, technologies, and resources that might advance the field and improve the outlook both for patients with PDAC pancreatic cancer and for individuals at high risk of developing the disease. Four investigational initiatives developed by this group of experts were recommended for consideration by the NCI to incorporate within the existing research portfolio for PDAC pancreatic cancer: This report fulfills the provision of the Act that the NCI develop a scientific framework for the first of two identified recalcitrant cancers within 18 months of enactment by July 2, The scientific framework will be sent to Congress and made available publicly on the website within 30 days of completion. Background Pancreatic cancers are a group of heterogeneous diseases of both the endocrine and exocrine pancreas. The incidence of PDAC pancreatic cancer increases with age, with a median age of 71 years at diagnosis. The overwhelming majority of PDAC pancreatic cancer cases are sporadic, that is, occurring without a history of the disease in first degree relatives. Although much is known about the evolution of PDAC pancreatic cancer from its earliest non-malignant precursor lesions, PDAC pancreatic cancer cases are most often diagnosed at late stages: Early detection has been problematic because of the absence of specific symptoms, the insufficiency of serological biomarkers with appropriate sensitivity and specificity, the lack of a clinically practical diagnostic examination for the disease, and the retroperitoneal position of the pancreas. Unlike many other malignant diseases, the metastatic spread of PDAC pancreatic cancer is thought to begin when the primary tumor is approximately 10 mm in size, when results of routine non-invasive imaging are often equivocal or negative5. Evidence comparing stage of disease with outcome following surgery suggests that death rates for PDAC pancreatic cancer would be reduced if the disease could be diagnosed at an earlier stage6,7. Since genomic sequencing data from primary and metastatic PDAC pancreatic cancer s indicate that it takes approximately 17 years for PDAC pancreatic cancer to progress from the tumor-initiating cell to the development of metastatic disease8, it would appear that there is ample time to diagnose and intervene, if diagnostic barriers to earlier detection could be overcome. PDAC pancreatic cancer s arise from a ductal cell lineage or from acinar cells that undergo acinar-to-ductal metaplasia9. Pancreatic intraepithelial neoplasms PanINs are the most common precursors to PDAC pancreatic cancer , and are often found associated with areas of focal pancreatic inflammation. Certain cystic lesions of the pancreas are also premalignant: A more detailed genomic analysis of a large number of PDAC pancreatic cancer s has uncovered an average of 63 genetic alterations, mostly point mutations, which affect up to 12 different signaling pathways or processes The expression of sonic hedgehog protein a ligand of the hedgehog pathway in both early and late PDAC pancreatic cancer lesions has been implicated as a chemoattractant in the desmoplastic response a host stromal response resulting in the proliferation of fibrotic tissue with an altered extracellular matrix and a pronounced hypovascularity Risk Assessment and Screening: Risk assessment studies have been performed associating germline susceptibility genes with the development of PDAC pancreatic cancer. Many of these case-control studies were performed using registries of families with a strong history of pancreatic cancer. Individuals in these families can have up to a fold increase in risk. Mutations in the following germline genes appear to have a role in susceptibility to PDAC pancreatic cancer although most do not have a high penetrance: Other hereditary diseases and syndromes have also been shown to increase risk for PDAC pancreatic cancer ; individuals with these syndromes often harbor mutations in the genes that confer risk for PDAC pancreatic cancer. Studies of the gene alterations in high risk individuals could also be important in informing studies of sporadic PDAC pancreatic cancer and lead to a better understanding of the etiology of the disease. Among the known non-genetic risk factors are: It has become clear that early detection of small resectable lesions, particularly pre-neoplastic lesions such as PanINs 2 and 3 and IPMNs or MCNs is the best hope for increasing the overall survival in this disease, since locally advanced and metastatic PDAC pancreatic cancer s are relatively insensitive to chemotherapy or radiation therapy, and surgical resection is often followed by relapses. So far, no serum or tumor-based biomarkers or biomarker panels have been discovered that are both sensitive and specific enough for accurate early detection. Progress in this area will have to come from new diagnostic discoveriesâ€"perhaps employing circulating tumor cells, tumor-derived DNA, autoantibodies, miRNA profiles, cytokines and chemokines, and from specific genetic, epigenetic, or proteomic signatures. Advances in non-invasive imaging technology that can detect tumors or pre-cancerous pancreatic lesions as small as 0. Invasive imaging such as endoscopic ultrasound can detect most pancreatic cysts, and targeted imaging agents have been shown to detect PanIN-3 lesions These methods of detection are expensive and cannot be used for routine screening, but could be employed in high risk individuals. One approach is to focus screening efforts on the groups of asymptomatic individuals who have been shown to have a higher risk of PDAC pancreatic cancer than the general population: The risk relationship between long-standing type 2 diabetes and PDAC pancreatic cancer , based on epidemiological evidence, is well-known as is the increased risk of PDAC pancreatic cancer in patients with newly-diagnosed diabetes; the relative risk estimate for patients diagnosed with diabetes at least five years prior to a diagnosis of PDAC pancreatic cancer is 2. As reviewed in the Workshop Report: Scanning the Horizon for Focused Interventions Appendix 1 , recent evidence suggests that screening for PDAC pancreatic cancer in patients with specific subtypes of diabetes, such as those newly diagnosed, and particularly in association with other risk factors such as genetic predisposition or tobacco use , may be a particularly fruitful approach to early detection. Models of PDAC pancreatic cancer: The development of new, clinically-relevant treatment approaches for PDAC pancreatic cancer can benefit greatly from testing in appropriate animal modelsâ€"ones that display the evolution of PDAC pancreatic cancer from the earliest lesion to frank PDAC pancreatic cancer , both morphologically and genetically, and demonstrate the hallmark features of the disease: Mouse xenografts using cultured PDAC pancreatic cancer cells are minimally useful because, although they often retain the key genetic alterations in signaling pathways of PDAC pancreatic cancer , they lack the early carcinogenic stages of the disease when treatment might be most effective , do not exhibit a natural disease progression, and are missing the immunological and other stromal components of the tumor-host interaction normally seen in the human disease. Mutant KRAS-driven genetically engineered mouse models GEMMs that recapitulate key aspects of human PDAC pancreatic cancer , including non-invasive precursor lesions, have now become some of the most important tools for the study of PDAC pancreatic cancer development and invasion, as well as preclinical testing of novel therapeutic approaches. The introduction of additional altered genes that are important in progression from early lesions to invasive PDAC pancreatic cancer has enabled the construction of specific models that faithfully follow the development of PDAC pancreatic cancer from PanINs or pancreatic cysts. For over a decade, gemcitabine or gemcitabine in combination with other chemotherapy agents has been the standard of care for advanced PDAC pancreatic cancer The addition of molecularly targeted therapies has been evaluated; to date, only erlotinib, targeting the EGF receptor, has demonstrated a modest, albeit statistically significant, response rate in combination with gemcitabine. The recent elucidation of alterations in the various signaling pathways in PDAC pancreatic cancer and in pancreatic cancer stem-like cells may lead to the testing of new agents and combinations in the future, and to defining the patient populations that might benefit from targeted systemic therapy. Resistance to therapy is a characteristic feature of PDAC pancreatic cancer , and the extent of resistance is greater than in many other human tumors. This could be due to inefficient drug delivery, intrinsic and acquired resistance of the tumor, tumor hypoxia, or the insensitivity of cancer stem-like cells to currently used agents. Novel approaches employing newly-developed biological molecules, discussed in the next section, may provide a means to overcome therapeutic resistance in patients with PDAC pancreatic cancer. These existing research programs, described in the National Cancer Institute Action Plan for Pancreatic cancer http: The NCI currently supports research programs dedicated to advancing progress in understanding the basic biology of PDAC pancreatic cancer. These programs involve studies to further elucidate the biology of the normal pancreas, including interdisciplinary approaches to understand islet cell development and function, the characterization of signaling pathways suspected to play a role in the development of PDAC pancreatic cancer , and large-scale genomic studies, including those of The Cancer Genome Atlas, that are developing a detailed understanding of the molecular underpinnings of PDAC pancreatic cancer development and evolution. Studies of the interactions between the microenvironment within which PDAC pancreatic cancer s develop and host factors, such as the response of the immune system to inflammatory stress, are attempting to understand the biological alterations that play an essential role in the progression of early PanIN lesions to PDAC pancreatic cancer. Risk, Prevention, Screening, and Diagnosis: The NCI provides resources for epidemiologic studies, including those involving several case-control and cohort consortia, to determine the role of environmental and genetic factors on the risk of developing PDAC pancreatic cancer. These investigations examine the influence of smoking, obesity, and physical activity on PDAC pancreatic cancer development. Several studies are also evaluating the potential of dietary factors to prevent or modify the initiation and progression of PDAC pancreatic cancer. Efforts to develop new diagnostic markers in serum for the early detection of PDAC pancreatic cancer are ongoing. Improving the capabilities of several different imaging techniques to enhance their sensitivity, enabling the detection of pre-neoplastic pancreatic cysts and small tumors that would both be amenable to complete surgical resection, is also a priority. Diagnostic and screening studies are being pursued both in laboratory models and through the expansion of registries for patients and families at high risk of developing PDAC pancreatic cancer. Because of the ineffectiveness of most current therapies, the NCI is investing in a wide range of approaches to improve the treatment of PDAC pancreatic cancer. These approaches are being pursued both in preclinical model systems and in clinical trials. Emphasis has been placed on understanding whether specific signaling pathways can be targeted for therapeutic benefit in PDAC pancreatic cancer. In particular, studies attempting to interfere with the dense stromal reaction that interferes with the delivery of therapeutic agents to both PDAC pancreatic cancer cells and the surrounding microenvironment including new nanoparticle drug formulations hold the promise of overcoming resistance to currently-available agents. In addition to drugs targeting specific molecular pathways, biological therapies are under study. Biological treatments being evaluated in animal models and patients include: One biological approach currently supported by the NCI that is of major interest has been the adoptive transfer of genetically modified T lymphocytes that express a chimeric antigen receptor CAR , an approach that has demonstrated significant therapeutic benefit in preclinical models of PDAC pancreatic cancer Patients with PDAC pancreatic cancer often experience debilitating symptoms that markedly diminish their quality of life. The degree of pain, fatigue, or anorexia that commonly accompanies PDAC pancreatic cancer often prevents the administration of standard treatment or participation in clinical trials. Thus, ongoing efforts to understand the etiology of and to develop treatment for fatigue and cachexia are important components of NCI-supported clinical research in the area of symptom management. NCI has recognized the need for a dedicated workforce to conduct pancreatic cancer research across a wide range of investigational topics. NCI-supported scientists are being trained to investigate the biology, epidemiology, and genetics of

PDAC pancreatic cancer and other malignancies, as well as combined modality approaches to treatment and the development of clinical trials with targeted agents, and the signal transduction pathways involved in drug resistance for these diseases. Grants, Contracts and Cooperative Agreements: The number of investigators supported by R01 grants for pancreatic cancer research has also increased since Figure 3. Realizing that it is important to attract to the field new investigators those who have never obtained a substantial NIH independent research award and early stage investigators new investigators who are, in addition, within 10 years of completing a terminal degree or a medical residency , the NCI has made an effort to fund these investigators who are embarking on a career in pancreatic cancer research. Figure 4 shows the number of extramural scientists who received pancreatic cancer research funding, utilizing all mechanisms, from the NCI in As one might expect, the total number of dollars awarded to new and early stage investigators studying PDAC pancreatic cancer is considerably less than that awarded to experienced investigators because many of the new awardees obtain fellowship, training, and exploratory grants, which have lower cost caps. Table 1 contains a list of the funding mechanisms and numbers of grants awarded to the next generation of researchers who are working on PDAC pancreatic cancer and supported by the NCI. The full data can be reviewed using the following link: Beyond grants, the NCI has many resources all of which are available to researchers working on PDAC pancreatic cancer and many other relevant cancers. Over scientific resources are available to qualified scientists. The resource topics include: Specific areas of interest to pancreatic cancer research are: The Specialized Programs of Research Excellence SPOREs is a grant program in translational research that uses a team science, multidisciplinary approach to focus on specific organ site cancers. SPOREs also provide opportunity for collaboration, including international collaboration, through the Developmental Research Program in each grant. Examples of SPORE research resources and projects related to pancreatic cancer can be found using these links: The ICRP, established in , is an alliance of public and private cancer research funding organizations from around the world working together to enhance global collaboration and strategic coordination of research. All of the partners code their research portfolios according to a Common Scientific Outline, a classification system that groups research into seven areas: The pooled data is incorporated into a shared database that researchers can search to identify potential collaborators and avoid duplication of efforts https: The workshop report, Pancreas Cancer: Four initiatives to expand PDAC pancreatic cancer research were recommended by the workshop: Understanding the biological relationship between PDAC pancreatic cancer and diabetes mellitus Evaluating longitudinal screening protocols for biomarkers for early detection of PDAC pancreatic cancer and its precursors Studying new therapeutic strategies in immunotherapy Developing new treatment approaches that interfere with RAS oncogene-dependent signaling pathways Relationships between PDAC pancreatic cancer and diabetes mellitus DM Clinical and genetic epidemiological studies have identified an association between DM of recent diagnosis and a subsequent diagnosis of pancreatic cancer About half of all PDAC pancreatic cancer patients have DM at the time of diagnosis, and half of those patients have experienced the onset of DM within the prior 3 years. Progress in the early detection of PDAC pancreatic cancer will therefore require a more detailed understanding of the clinical and biological characteristics of the population of patients who subsequently develop or have undiagnosed PDAC pancreatic cancer in the setting of newly diagnosed diabetes. It will be essential to define specific risk factors to make screening efforts cost-effective by focusing on these individuals. It also will be important to understand whether other risk factors for the development of PDAC pancreatic cancer such as exposure to tobacco smoke interact with diabetes to increase the risk of PDAC pancreatic cancer. This is especially true for individuals with type 3c diabetes diabetes secondary to pancreatic diseases with coexisting chronic pancreatitis, in whom the risk of PDAC pancreatic cancer is increased fold.

4: SSWEC74/UW A Scientific Framework for Managing Urban Natural Areas

A scientific framework with defined sets of supporting data should allow the beginning of a more structured approach to qualifying biomarkers for use in pivotal studies of rare disease treatments.

Timeline of the history of scientific method Aristotle , â€” BCE. A polymath, considered by some to be the father of modern scientific methodology , due to his emphasis on experimental data and reproducibility of its results. This is the greatest piece of Retroductive reasoning ever performed. According to Albert Einstein , "All knowledge of reality starts from experience and ends in it. Propositions arrived at by purely logical means are completely empty as regards reality. Because Galileo saw this, and particularly because he drummed it into the scientific world, he is the father of modern physics â€" indeed, of modern science altogether. The term "scientific method" did not come into wide use until the 19th century, when other modern scientific terminologies began to emerge such as "scientist" and "pseudoscience" and significant transformation of science was taking place. The scientific method is the process by which science is carried out. This is in opposition to stringent forms of rationalism: A strong formulation of the scientific method is not always aligned with a form of empiricism in which the empirical data is put forward in the form of experience or other abstracted forms of knowledge; in current scientific practice, however, the use of scientific modelling and reliance on abstract typologies and theories is normally accepted. The scientific method is of necessity also an expression of an opposition to claims that e. Different early expressions of empiricism and the scientific method can be found throughout history, for instance with the ancient Stoics , Epicurus , [29] Alhazen , [30] Roger Bacon , and William of Ockham. From the 16th century onwards, experiments were advocated by Francis Bacon , and performed by Giambattista della Porta , [31] Johannes Kepler , [32] and Galileo Galilei. The hypothetico-deductive model [35] formulated in the 20th century, is the ideal although it has undergone significant revision since first proposed for a more formal discussion, see below. Staddon argues it is a mistake to try following rules [36] which are best learned through careful study of examples of scientific investigation. Process The overall process involves making conjectures hypotheses , deriving predictions from them as logical consequences, and then carrying out experiments based on those predictions to determine whether the original conjecture was correct. Though the scientific method is often presented as a fixed sequence of steps, these actions are better considered as general principles. As noted by scientist and philosopher William Whewell â€" , "invention, sagacity, [and] genius" [11] are required at every step. Formulation of a question The question can refer to the explanation of a specific observation , as in "Why is the sky blue? If the answer is already known, a different question that builds on the evidence can be posed. When applying the scientific method to research, determining a good question can be very difficult and it will affect the outcome of the investigation. A statistical hypothesis is a conjecture about a given statistical population. For example, the population might be people with a particular disease. The conjecture might be that a new drug will cure the disease in some of those people. Terms commonly associated with statistical hypotheses are null hypothesis and alternative hypothesis. A null hypothesis is the conjecture that the statistical hypothesis is false; for example, that the new drug does nothing and that any cure is caused by chance. Researchers normally want to show that the null hypothesis is false. The alternative hypothesis is the desired outcome, that the drug does better than chance. Prediction This step involves determining the logical consequences of the hypothesis. One or more predictions are then selected for further testing. The more unlikely that a prediction would be correct simply by coincidence, then the more convincing it would be if the prediction were fulfilled; evidence is also stronger if the answer to the prediction is not already known, due to the effects of hindsight bias see also postdiction. Ideally, the prediction must also distinguish the hypothesis from likely alternatives; if two hypotheses make the same prediction, observing the prediction to be correct is not evidence for either one over the other. Scientists and other people test hypotheses by conducting experiments. The purpose of an experiment is to determine whether observations of the real world agree with or conflict with the predictions derived from a hypothesis. If they agree, confidence in the hypothesis increases; otherwise, it decreases. Agreement does not assure that the hypothesis is true; future experiments may reveal problems. Karl Popper advised scientists to try to falsify hypotheses, i. Large numbers of successful confirmations are not convincing if they arise from experiments that avoid risk. For example, tests of medical treatments are commonly run as double-blind tests. Test personnel, who might unwittingly reveal to test subjects which samples are the desired test drugs and which are placebos , are kept ignorant of which are which. Such hints can bias the responses of the test subjects. Furthermore, failure of an experiment does not necessarily mean the hypothesis is false. Experiments always depend on several hypotheses, e. See the Duhemâ€"Quine thesis. Astronomers do experiments, searching for planets around distant stars. Finally, most individual experiments address highly specific topics for reasons of practicality. As a result, evidence about broader topics is usually accumulated gradually. Analysis This involves determining what the results of the experiment show and deciding on the next actions to take. The predictions of the hypothesis are compared to those of the null hypothesis, to determine which is better able to explain the data. In cases where an experiment is repeated many times, a statistical analysis such as a chi-squared test may be required. If the evidence has falsified the hypothesis, a new hypothesis is required; if the experiment supports the hypothesis but the evidence is not strong enough for high confidence, other predictions from the hypothesis must be tested. Once a hypothesis is strongly supported by evidence, a new question can be asked to provide further insight on the same topic. Evidence from other scientists and experience are frequently incorporated at any stage in the process. Depending on the complexity of the experiment, many iterations may be required to gather sufficient evidence to answer a question with confidence, or to build up many answers to highly specific questions in order to answer a single broader question. DNA example The basic elements of the scientific method are illustrated by the following example from the discovery of the structure of DNA: Previous investigation of DNA had determined its chemical composition the four nucleotides , the structure of each individual nucleotide, and other properties. It had been identified as the carrier of genetic information by the Averyâ€"MacLeodâ€"McCarty experiment in , [40] but the mechanism of how genetic information was stored in DNA was unclear. Watson hypothesized that DNA had a helical structure. This prediction was a mathematical construct, completely independent from the biological problem at hand. The results showed an X-shape. When Watson saw the detailed diffraction pattern, he immediately recognized it as a helix. Each step of the example is examined in more detail later in the article. Other components The scientific method also includes other components required even when all the iterations of the steps above have been completed: As a result, it is common for a single experiment to be performed multiple times, especially when there are uncontrolled variables or other indications of experimental error. For significant or surprising results, other scientists may also attempt to replicate the results for themselves, especially if those results would be important to their own work. Some journals request that the experimenter provide lists of possible peer reviewers, especially if the field is highly specialized. Peer review does not certify correctness of the results, only that, in the opinion of the reviewer, the experiments themselves were sound based on the description supplied by the experimenter. If the work passes peer review, which occasionally may require new experiments requested by the reviewers, it will be published in a peer-reviewed scientific journal. The specific journal that publishes the results indicates the perceived quality of the work. This allows scientists to gain a better understanding of the topic under study, and later to use that understanding to intervene in its causal mechanisms such as to cure disease. The better an explanation is at making predictions, the more useful it frequently can be, and the more likely it will continue to explain a body of evidence better than its alternatives. The most successful explanations â€" those which explain and make accurate predictions in a wide range of circumstances â€" are often called scientific theories. Most experimental results do not produce large changes in human understanding; improvements in theoretical scientific understanding typically result from a gradual process of development over time, sometimes across different domains of science. In general, explanations become accepted over time as evidence accumulates on a given topic, and the explanation in question proves more powerful than its alternatives at explaining the evidence. Often subsequent researchers re-formulate the explanations over time, or combined explanations to produce new explanations. Tow sees the scientific method in terms of an evolutionary algorithm applied to science and technology. That is, no theory can ever be considered final, since new problematic evidence might be discovered. If such evidence is found, a new theory may be proposed, or more commonly it is found that modifications to the previous theory are sufficient to explain the new evidence. The strength of a theory can be argued[by whom? Theories can also become subsumed by other theories. Thus, in certain cases independent, unconnected, scientific observations can be connected to each other, unified by principles of increasing explanatory power. In subsequent modifications, it has also subsumed aspects of many other fields such as biochemistry and molecular biology. This demonstrates a use of photography as an experimental tool in science. Scientific methodology often directs that hypotheses be tested in controlled conditions wherever possible. This is frequently possible in certain areas, such as in the biological sciences, and more difficult in other areas, such as in astronomy. The practice of experimental control and reproducibility can have the effect of diminishing the potentially harmful effects of circumstance, and to a degree, personal bias. For example, pre-existing beliefs can alter the interpretation of results, as in confirmation bias ; this is a heuristic that leads a person with a particular belief to see things as reinforcing their belief, even if another observer might disagree in other words, people tend to observe what they expect to observe. Such proto-ideas are at first always too broad and insufficiently specialized. Once a structurally complete and closed system of opinions consisting of many details and relations has been formed, it offers enduring resistance to anything that contradicts it. MacKay has analyzed these elements in terms of limits to the accuracy of measurement and has related them to instrumental elements in a category of measurement. The scientific community and philosophers of science generally agree on the following classification of method components. These methodological elements and organization of procedures tend to be more characteristic of natural sciences than social sciences. Nonetheless, the cycle of formulating hypotheses, testing and analyzing the results, and formulating new hypotheses, will resemble the cycle described below. The scientific method is an iterative, cyclical process through which information is continually revised. These activities do not describe all that scientists do see below but apply mostly to experimental sciences e. The elements above are often taught in the educational system as "the scientific method". A linearized, pragmatic scheme of the four points above is sometimes offered as a guideline for proceeding: Characterizations The scientific method depends upon increasingly sophisticated characterizations of the subjects of investigation. The subjects can also be called unsolved problems or the unknowns.

A SCIENTIFIC FRAMEWORK pdf

5: Conceptual framework - Wikipedia

4. Framework of Scientific Research. Creswell's () research design framework will be used to explore the research process. This framework was chosen for a few reasons.

The Hedgehog and the Fox: Simon and Schuster, introduction by M. Microeconomics, 9th edition, New York: Principles of Microeconomics, 5th edition. The Case of Family Sociology". The Sociological Quarterly Vol. Frameworks, Conflict in Balance. Shields and Hassan Tajalli , "Intermediate Theory: A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management. Tools for Excellent Papers: Presentation at the American Society for Public Administration annual conference, Washington DC March 15, This powerpoint depicts the connection between football and conceptual frameworks in the context of a large graduate student paper. The national presentation was delivered before Public Administration graduate students in Washington DC. The Practice of Social Research 11th edition. Brains et al also identify exploration, explanation and description as research purposes. Explanation is connected to hypotheses testing as a framework. The other research purposes are not connected to a framework. The formal hypotheses took the form of relational statements. Building factors influence residential fire rates. These hypotheses could be represented visually as H1: Melvin and Leigh https:

6: Scientific method - Wikipedia

Scientific Framework The scientific objectives of the project are described in the following publication: The Global Water System Project: Science Framework and Implementation Activities. Framing Committee of the GWSP ().

Mazzotti and Carol Morgenstern 2 The purposes of this paper are: The Challenge As natural areas shrink and fragment, our ability to sustain economic growth and conserve biological diversity and ecological integrity is being tested Grumbine ; Noss and Cooperrider Meeting the challenge of conserving regional ecological integrity in urban and urbanizing landscapes will depend on effective growth management planning, which includes both ecologically sensitive site design for specific projects and the development of ecological reserve systems Adams and Dove Protecting urban natural areas not only contributes to the conservation of biological diversity, but also provides valuable opportunities for human enjoyment. However, adding the variable of human use to the already complex equation of managing an urban natural area system exacerbates the difficulties inherent in managing fragmented, isolated, and, frequently, disturbed habitat patches. Meeting the Challenge It is clear that sound, science-based planning provides the only alternative for meeting the multiple demands, categorized as conservation or use, that society places on protected urban natural areas. A science-based habitat planning program not only provides a foundation for making the best decisions possible and the flexibility of modifying them, but also fosters confidence and consensus from a public that has to both pay for and then live with the decisions made during this process. A scientific framework also provides consistency to the planning and management process through time and staff changes. As of this writing, 17 sites have been purchased to preserve the best of the remaining natural heritage of Broward County. Management of the sites began immediately with a program of fencing, trash removal, and non-native plant control. ESL resource management plans will combine modern ecological resource management practice with consensus building and conflict resolution to develop a scientific framework for managing these sites. Adding a human dimension to natural area management through consensus building and conflict resolution is an essential aspect of any habitat conservation program. The public deserves good decisions regarding management of what will be the green space heritage of future generations. It is important to recognize that resource management is a long-term greater than 50 years commitment to restoring and maintaining the ecological integrity of natural areas, while providing opportunities for human enjoyment. Natural area reserve design and selection has a substantial body of theory and practice to provide a framework for action Bedward et al. No such framework is available for managing natural areas once selection and acquisition have occurred; yet the ultimate success of any natural system will depend on good, science-based management plans. Scientific Framework The scientific framework for developing a management plan is shown in Figure 1. Management goals and objectives are defined based on the results of the inventory and evaluation of resources and the scoping process. The scoping process public involvement is particularly important because the expectations of the public for conservation and use of the natural resources of a site are ascertained at that time. In Broward County, we use a combination of advisory committees and public workshops and hearings to accomplish this task. Public participation and cooperation is importantâ€”if not essentialâ€"for successful management of urban natural area systems. People should be encouraged to use urban natural areas Adams and Dove However, not every site will be able to withstand unregulated use. Controls should be established, when necessary, by site design e. It is crucial to recognize that limits to public use will be more readily accepted by the public if the need for restrictions is carefully explained prior to their institution. A detailed natural resource evaluation should be performed for each site, including, but not necessarily limited to, vegetation mapping and wildlife inventories Tylka and Cook ; Soule These must be evaluated. Global positioning and geographic information system technology can be used to collect and manage a spatially explicit environmental database. When all this has been accomplished, management plans can be developed for each site that identify significant resources, threats to ecological integrity, disturbed areas requiring restoration, potential for enhancement, necessary maintenance activities, and opportunities for public access and use. Alternative plans for site management, if necessary, can be assessed for their consistency with regional ecological goals. Since management decisions inevitably will be made with a degree of uncertainty, site management plans will be implemented along with monitoring programs designed to evaluate the achievement of specific objectives. Management plans must be flexible enough to accommodate necessary modifications. This approach allows for adaptive management of a reserve system Holling ; Jones This is the cornerstone of a scientific approach to natural area management. We view management decisions and actions as hypotheses of ecosystem response. That is, we predict that a particular fire management program or non-native plant management program is going to have a particular result or effect on the target system. The monitoring program is then viewed as an experiment designed to test the hypothesis or management decision. If our management activity yields the desired result meets a specific measurable objective , then we have made the correct management decision. If not, then the management plans should be revised adapted and retested. Successful management will be the result of an iterative process based on this procedure. And we point out that monitoring continues throughout the lifetime of the management process. However, resource inventories and the scoping process have revealed that some management issuesâ€”listed species, invasive non-native species, and public useâ€”will be common to most sites. Other issues, such as using ESLs as recipient locations for off-site mitigation, will probably affect many sites. This section covers concerns common to all sites, their relationship to ESL management in Broward County, and recommends a systematic approach for dealing with these issues on particular sites. Realizing that there are limited resources to deal with the limitless problems of urban natural area management, an important part of our systematic approach for dealing with management issues is developing a ranking system to allow for setting priorities and policies for management actions. Designations Explained Endangered species have the greatest risk of extinction, and threatened species could reach that status in the near future. Rare species are those with limited geographic distribution or a sparse distribution over a larger range. Species of special concern designation can be applied to those in danger of becoming threatened, species recently recovering from being threatened, poorly known species, or ecologically important species. Commercially exploited species are defined as being threatened by commercial collection. FNAI classifies species as globally or state-imperiled, rare, or secure. Since the most common form of endangerment of species is habitat loss, the acquisition of ESLs in Broward County may offer opportunities to protect remaining critical habitat. Species Monitoring To effectively observe changes in species population status, monitoring must be performed over extended periods of time. Monitoring programs must be designed to specifically identify depletions in species populations as well as status of populations already listed. Preventing a decline in species numbers to the point of listing is a more efficient way of managing species then trying to bring the species back tosatisfactory numbers after listing. A site-specific listing will be established for those species that have experienced declines in populations to a level of concern. Management priority for listed species is determined from the listing category, the status resident breeding, resident non-breeding, transient of the species on a site, and the feasibility of managing for a given species on a site Table 1 and Table 2. Invasive Non-Native Species "Non-native", "alien", "exotic", and "feral" species are all terms used to describe plants or animals that are of foreign originâ€”yet exist, and in some cases thriveâ€”in natural areas. Displacement of native species and alteration of ecosystem functions are possible results of invasion by non-native species. Florida, California, and Hawaii are more prone to invasion and have suffered greater ecological degradation than other areas of the United States. Florida is especially vulnerable due to the disturbance of native habitats and its subtropical climate. Some authorities consider exotic species to be the most pervasive factor influencing biological diversity in natural systems Coblentz The effects of non-native species has been called an ecological explosion creating a biologically impoverished landscape Schmitz and Brown This attitude of environmental crisis has resulted in current policies of eradication of non-indigenous species, especially plants Westman In reviewing eradication programs, two problems become readily apparent: Furthermore, there is often a lack of knowledge about how to restore a native system after exotic plant eradication Westman Given on-site disturbance of urban natural areas and surroundings, and on-site seed sourcesâ€”eradication of non-native plants cannot be achieved. Past experience with exotic plant removal has shown that each species must be evaluated on an individual basis for its impact on existing resources, and that each invaded habitat should be evaluated for the best available technology for management. Hence, species with the most impact are given highest management priority Table 3 , and techniques are developed that are sensitive to the existing condition of the management area. Relatively benign species should be given the lowest priority for removal. Recognizing that some non-native plant species may actually benefit wildlife in an urban environment is also important. Mitigation Mitigation, in this context, is defined as compensation for impacts to natural systems primarily wetlands caused by development. Relevant to ESL management, county, state and federal agencies issue permits to developers. Although a controversial practice, the use of public lands as recipient sites for mitigation of habitat losses on private lands is occurring and will continue to occur. When mitigation on public lands is allowed, natural area management plans must address methods to best apply these mitigation opportunities to accomplish resource management goals. To be effective, and to maximize the benefits to reserve systems, mitigation programs should be approached comprehensively. In particular, mitigation programs should be consistent with existing management goals, objectives, and success criteria. Two things are accomplished by this tactic. First, this insures that resource management drives what mitigation is accepted for a site, rather than have mitigation drive management. This allays the perception that mitigation opportunities are bought rather than earned. Second, ESL management standards may be, and probably should be, higher than those set for typical mitigation projects. Mitigation on public lands should conform to the highest standards attainable. ESL sites, with their wetland areas and non-native and nuisance species problems, provide occasions for mitigation by the private sector. One method of applying mitigation opportunities to accomplishing resource management objectives would be to establish a memorandum of agreement MOA between the public agency for example, Broward County Parks and Recreation Division PRD and the relevant permitting agency. This would enable the participants to develop specific conditions, including methods, materials, liability, monitoring, and time frames, for permits to insure that ESL site management goals and objectives are being met. Another alternative, a mitigation trust fund MTF , would determine rates per acre for mitigation projects. Mitigation requirements would be met by deposits in the MTF. PRD could then apply the funds as set out in resource management plans. Whichever the mechanism, a strong partnership between mitigation participants will be necessary for a successful mitigation program on ESLs. Importance of Mitigation Activities in Upland Areas We further recommend that any mitigation agreement recognize the importance of mitigation activities in the upland areas of ESL sites. Uplands are among the most impacted habitats on many of the sites and the most diminished habitats in surrounding areas. The rationale for extending mitigation efforts to upland areas includes: Wetland permits frequently require consideration of upland buffers and listed species habitats; and The ecological functions of wetlands on ESL sites is dependent on restoring the upland matrix within which they historically occurred. Public Use Preserving and using natural areas can be characterized as the dual horns of the dilemma of natural area management. We establish reserve systems because we wish to preserve natural resources that have been identified as valuable and important to society. Natural area acquisition is frequently justified in terms of benefits and uses to humans, after all, humans are paying the cost of protection. In Broward County, the numerous benefits include water storage and aquifer recharge, flood attenuation, plant and animal refuges, and recreational opportunities. Only recreation requires the presence of humans for benefits to accrue. Yet, it is human presence in natural areas that provides the greatest challenge to resource managers. As stated earlier, one goal of ESL management to provide for recreational opportunities.

A SCIENTIFIC FRAMEWORK pdf

7: Scientific Framework for Pancreatic Cancer - Pancreatica

â€¢ A framework is a way of representing the empirical relations between every aspect of inquiry when considered a scientific theory or research. It describes the general direction and the constraints of the theory or research.

Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the futureâ€"related, for example, to the environment, energy, and healthâ€"require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering. Many recent calls for improvements in K science education have focused on the need for science and engineering professionals to keep the United States competitive in the international arena. Although there is little doubt that this need is genuine, a compelling case can also be made that understanding science and engineering, now more than ever, is essential for every American citizen. Science, engineering, and the technologies they influence permeate every aspect of modern life. Indeed, some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering. Page 8 Share Cite Suggested Citation: A Framework for K Science Education: Practices, Crosscutting Concepts, and Core Ideas. The National Academies Press. It is intended as a guide to the next step, which is the process of developing standards for all students. Thus it describes the major practices, crosscutting concepts, and disciplinary core ideas that all students should be familiar with by the end of high school, and it provides an outline of how these practices, concepts, and ideas should be developed across the grade levels. Engineering and technology are featured alongside the physical sciences, life sciences, and earth and space sciences for two critical reasons: By framework we mean a broad description of the content and sequence of learning expected of all students by the completion of high schoolâ€"but not at the level of detail of grade-by-grade standards or, at the high school level, course descriptions and standards. Instead, as this document lays out, the framework is intended as a guide to standards developers as well as for curriculum designers, assessment developers, state and district science administrators, professionals responsible for science teacher education, and science educators working in informal settings. There are two primary reasons why a new framework is needed at this time. One is that it has been 15 or more years since the last comparable effort at the national scale, and new understandings both in science and in teaching and learning science have developed over that time. The second is the opportunity provided by a movement of multiple states to adopt common standards in mathematics and in language arts, which has prompted interest in comparable documents for science. This framework is the first part of a two-stage process to produce a next-generation set of science standards for voluntary adoption by states. The second stepâ€"the development of a set of standards based on this frameworkâ€"is a state-led effort coordinated by Achieve, Inc. The learning experiences provided for students should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions. Throughout grades K, students should have the opportunity to carry out scientific investigations and engineering design projects related to the disciplinary core ideas. By the end of the 12th grade, students should have gained sufficient knowledge of the practices, crosscutting concepts, and core ideas of science and engineering to engage in public discussions on science-related issues, to be critical consumers of scientific information related to their everyday lives, and to continue to learn about science throughout their lives. They should come to appreciate that science and the current scientific understanding of the world are the result of many hundreds of years of creative human endeavor. It is especially important to note that the above goals are for all students, not just those who pursue careers in science, engineering, or technology or those who continue on to higher education. We anticipate that the insights gained and interests provoked from studying and engaging in the practices of science and engineering during their K schooling should help students see how science and engineering are instrumental in addressing major challenges that confront society today, such as generating sufficient energy, preventing and treating diseases, maintaining supplies of clean water and food, and solving the problems of global environmental change. In addition, although not all students will choose to pursue careers in science, engineering, or technology, we hope that a science education based on the framework will motivate and inspire a greater number of peopleâ€"and a better representation Page 10 Share Cite Suggested Citation: The framework principally concerns itself with the first taskâ€"what all students should know in preparation for their individual lives and for their roles as citizens in this technology-rich and scientifically complex world. Course options, including Advanced Placement AP or honors courses, should be provided that allow for greater breadth or depth in the science topics that students pursue, not only in the usual disciplines taught as natural sciences in the K context but also in allied subjects, such as psychology, computer science, and economics. Achieving the Vision The framework is motivated in part by a growing national consensus around the need for greater coherenceâ€"that is, a sense of unityâ€"in K science education. Not only is such an approach alienating to young people, but it can also leave them with just fragments of knowledge and little sense of the creative achievements of science, its inherent logic and consistency, and its universality. Moreover, that approach neglects the need for students to develop an understanding of the practices of science and engineering, which is as important to understanding science as knowledge of its content. The framework endeavors to move science education toward a more coherent vision in three ways. First, it is built on the notion of learning as a developmental Page 11 Share Cite Suggested Citation: It is designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works. The goal is to guide their knowledge toward a more scientifically based and coherent view of the sciences and engineering, as well as of the ways in which they are pursued and their results can be used. Second, the framework focuses on a limited number of core ideas in science and engineering both within and across the disciplines. The committee made this choice in order to avoid shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reduction of the sheer sum of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve depth of understanding of the core ideas presented. Delimiting what is to be learned about each core idea within each grade band also helps clarify what is most important to spend time on and avoid the proliferation of detail to be learned with no conceptual grounding. Third, the framework emphasizes that learning about science and engineering involves integration of the knowledge of scientific explanations i. Thus the framework seeks to illustrate how knowledge and practice must be intertwined in designing learning experiences in K science education. But it is important to define what is meant by each of these terms in this reportâ€"and why. In the K context, science is generally taken to mean the traditional natural sciences: In this document, we include core ideas for these disciplinary areas, but not for all areas of science, as discussed further below. This limitation matches our charge and the need of schools for a next generation of standards in these areas. Engineering and technology are included as they relate to the applications of science, and in so doing they offer students a path to strengthen their understanding of the role of sciences. We use the term engineering in a very broad sense to mean any engagement in a systematic practice of design to achieve solutions to particular human problems. Likewise, we broadly use the term technology to include all types of human-made systems and processesâ€"not in the Page 12 Share Cite Suggested Citation: Technologies result when engineers apply their understanding of the natural world and of human behavior to design ways to satisfy human needs and wants. Engineering and technology, defined in these broad ways, are included in the framework for several reasons. First, the committee thinks it is important for students to explore the practical use of science, given that a singular focus on the core ideas of the disciplines would tend to shortchange the importance of applications. Second, at least at the K-8 level, these topics typically do not appear elsewhere in the curriculum and thus are neglected if not included in science instruction. Finally, engineering and technology provide a context in which students can test their own developing scientific knowledge and apply it to practical problems; doing so enhances their understanding of scienceâ€"and, for many, their interest in scienceâ€"as they recognize the interplay among science, engineering, and technology. We are convinced that engagement in the practices of engineering design is as much a part of learning science as engagement in the practices of science [2]. It is important to note, however, that the framework is not intended to define course structure, particularly at the high school level. Many high schools already have courses designated as technology, design, or even engineering that go beyond the limited introduction to these topics specified in the framework. These courses are often taught by teachers who have specialized expertise and do not consider themselves to be science teachers. The committee takes no position on such coursesâ€”nor, in fact, on any particular set of course sequence options for students at the high school level. We simply maintain that some introduction to engineering practice, the application of science, and the interrelationship of science, engineering, and technology is integral to the learning of science for all students. Page 13 Share Cite Suggested Citation: Such course options may include topics, such as neurobiology, and even disciplines, such as economics, that are not included in this framework. Social, Behavioral, and Economic Sciences Although some aspects of the behavioral sciences are incorporated in the framework as part of life sciences, the social, behavioral, and economic sciences are not fully addressed. The committee did not identify a separate set of core ideas for these fields for several reasons. First, the original charge to the committee did not include these disciplines. Second, social, behavioral, and economic sciences include a diverse array of fields sociology, economics, political science, anthropology, all of the branches of psychology with different methods, theories, relationships to other disciplines of science, and representation in the K curriculum. Although some are currently represented in grades K, many are not or appear only in courses offered at the high school level. Most of these documents do not cover all of the fields that are part of the social, behavioral, and economic sciences comprehensively, and some omit them entirely. Fourth, understanding how to integrate the social, behavioral, and economic sciences into standards, given how subjects are currently organized in the K system, is especially complex. These fields have typically not been included as part of the science curriculum and, as noted above, are not represented systematically in some of the major national-level documents that identify core concepts for K science. Also, many of the topics related to the social, behavioral, and economic sciences are incorporated into curricula or courses identified as social studies and may be taught from a humanities perspective. On the contrary, the committee strongly believes that these important disciplines need their own framework for defining core concepts to be learned at the K level and that learning the development of understanding of content and practices in the physical, life, earth, and space sciences and engineering should be strongly linked with parallel learning in the social, behavioral, and economic sciences. Any such framework must also address important and challenging issues of school and curriculum organization around the domain of social sciences and social studies. Our committee has neither the charge nor the expertise to undertake that important work. Thus, although we have included references to some of the social, behavioral, and economic issues connected to the sciences that are the focus of our own framework see, for example, Core Idea 2 in engineering, technology, and applications of science , we do not consider these references to define the entirety of what students should learn or discuss about social, behavioral, and economic sciences. In a separate effort, the National Research Council NRC has plans to convene a workshop to begin exploring a definition of what core ideas in the social, behavioral, and economic sciences would be appropriate to teach at the K level and at what grade levels to introduce them. As noted above, there are many quite distinct realms of study covered by the terms. Given the multiplicity and variety of disciplines involved, only a few of which are currently addressed in any way in K classrooms, there is much work to be done to address the role of these sciences in the development of an informed 21st-century citizen. It is clear, however, to the authors of this report that these sciences, although different in focus, do have much in common with the subject areas included here, so that much of what this report discusses in defining scientific and engineering practices and crosscutting concepts has application across this broader realm of science. Computer Science and Statistics Computer science and statistics are other areas of science that are not addressed here, even though they have a valid presence in K education. Statistics is basically a subdiscipline of mathematical sciences, and it is addressed to some extent in the common core mathematics standards. But, again, because this area of the curriculum has a history and a teaching corps that are generally distinct from those of the sciences, the committee has not taken this domain as part of our charge. Once again, this omission should not be interpreted to mean that computer science or statistics should be excluded from the K curriculum. There are aspects of computational and statistical thinking that must be understood and applied in learning about the sciences, and we identify these aspects, along with mathematical thinking, in our discussion of science practices in Chapter 3. Composed of 18 members reflecting a diversity of perspectives and a broad range of expertise, the committee includes professionals in the natural sciences, mathematics, engineering, cognitive and developmental psychology, the learning sciences, education policy and implementation, research on learning science in the classroom, and the practice of teaching science. The committee was also charged with articulating how these disciplinary ideas and crosscutting concepts intersect for at least three grade levels and to develop guidance for implementation see Box Scope and Approach The committee carried out the charge through an iterative process of amassing information, deliberating on it, identifying gaps, gathering further information to fill these gaps, and holding further discussions. In our search for particulars, we held three public fact-finding meetings, reviewed published reports and unpublished research, and commissioned experts to prepare and present papers. During the fifth and sixth meetings, we considered the feedback received from the public and developed a plan for revising the draft framework based on this input see below for further details. Page 16 Share Cite Suggested Citation:

8: Science Framework

A Framework for K Science Education outlines a broad set of expectations for students in science and engineering in grades K These expectations will inform the development of new standards for K science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators.

9: Scientific Framework :: GWSP

A scientific theory is a specific type of theory used in the scientific method. The term "theory" can mean something different, depending on whom you ask. "The way that scientists use the word.

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