I Only Wish I’D Known: Voices of Novice Alternatively Certified Special Education Teachers

Author
Pat Casey, Karen Dunlap, Heather Brister, Michele Davidson

Abstract
Increasing numbers of special education teachers enter the profession via widely varying preparation programs, also known as alternative certification programs. This article describes a survey of 54 novice special education teachers from alternative certification (AC) programs. In this paper, the authors discuss both challenges and support needs and provide recommendations for administrators who are hiring these AC teachers. Participants reported some of the major challenges faced were, for example, classroom management and knowing what to teach (content/curriculum). In contrast, the participants reported little need for support in the areas of parent communication and entering the school community.

Citation

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Assistant to “Full”: Rank and the Development of Expertise

Author
Dorothy E. Finnegan, Adrienne E. Hyle

Abstract
Background/Context: Faculty rank has been used variously as an independent variable to explore faculty attitudes and behaviors such as productivity, institutional commitment, and turnover, and as a dependent variable to establish the case for discrimination. As a sociological role, however, rank has been neglected. We know little about the competencies of the faculty who have earned their rank, and the presence of a connection between advancing through the ranks to the qualitative progression of professional mastery or expertise has yet to be investigated. This study begins this exploration through a review of the development of professional expertise among history faculty.

Purpose/Objective/Research Question/Focus of Study: As a result of personal experience and professional observations, our initial interest was to ascertain to what extent expertise is associated with rank. We assumed that assistant professors are by no means novices, rather, that they are less expert than professors. We wondered if explicit and differentiated expertise behaviors associated with the three primary ranks could be identified. In other words, to what extent is the acquisition of expert skill related to the progression through academic rank?

Population/Participants/Subjects: A random sample of 13 faculty members in history departments offering baccalaureate through doctoral programs from two institutions in the same Carnegie category (RU/H) served as participants.

Research Design: This is a qualitative two-site case study. Data Collection and Analysis: Absent an applicable analytical model, we devised a nondirective interview outline that allowed us to probe faculty about the ways by which they think and execute their work, and we discuss the development of their confidence and conviction in research, publications, professional activities, and teaching. Throughout the interviews, we asked faculty to place their responses in the context of the rank in which the activity occurred.

Findings/Results: Although moving from one rank to another is a clean and discrete act or event, moving from one level of expertise to the next is not.

Conclusions/Recommendations: Although the interviews suggest that patterns exist by rank, we do not believe that rank is the sole or dominant force in this growth. Rather, as one might suspect, a combination of factors exist that propel and guide faculty toward control and confidence in their expertise. We still hold though that rank is a more important social role than the research would have us believe. Although it may be symbolic in nature, it is a signifier to professional colleagues, to students, to the public, and to the individual who has earned it that this person has achieved a certain level of expertise in his or her field.

Citation

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Mathematics Skills in Early Childhood: Exploring Gender and Ethnic Patterns

Author
Joohi Lee, Sungseek Moon, Rebecca L. Hegar

Abstract
This study is purposed to investigate gender gaps in mathematics within (boys vs. girls in each ethnic group) and between four major ethnic groups (boys vs. boys and girls vs. girls between ethnic groups) using a nationally representative data, ECLS-K (Early Childhood Longitudinal Study-K Cohort). The example includes 9,824 Whites, 2,469 African American, 3,015 Hispanic, and 1,100 Asian students. Two Analyses of Variance (ANOVA) models based on gender were conducted to assess the statistical significance of differences among ethnic groups and Latent Growth Curve (LGC) models were used to measure growth functions at each point of times. According to the results, gender gaps in mathematics performance were statistically significant and varied by ethnicity at different points in time. White male students consistently showed significantly higher scores on mathematics than White female students from kindergarten through the third grade. Among other ethnic groups (African Americans, Hispanics and Asian Americans) gender gaps in mathematics were not as consistent. However, regardless of student ethnic backgrounds, a gender gap favoring male students became statistically significant at the third grade. White male students also scored significantly higher than male students of other ethnic groups from kindergarten through the third grade, and White female students scored higher than girls from other ethnic groups.

Citation

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Skin Blood Flow and Local Temperature Independently Modify Sweat Rate During Passive Heat Stress in Humans

Author
Jonathan E. Wingo, David A. Low, David M. Keller, R. Matthew Brothers, Manabu Shibasaki, Craig G. Crandall

Abstract
Sweat rate (SR) is reduced in locally cooled skin, which may result from decreased temperature and/or parallel reductions in skin blood flow. The purpose of this study was to test the hypotheses that decreased skin blood flow and decreased local temperature each independently attenuate sweating. In Protocols I and II, 8 subjects rested supine while wearing a water-perfused suit for the control of whole-body skin and internal temperatures. While 34 °C water perfused the suit, 4 microdialysis membranes were placed in posterior forearm skin not covered by the suit in order to manipulate skin blood flow using vasoactive agents. Each site was instrumented for control of local temperature and measurement of local sweat rate (capacitance hygrometry) and skin blood flow (laser-Doppler flowmetry). In Protocol I, 2 sites received norepinephrine to reduce skin blood flow while 2 sites received Ringer's solution (control). All sites were maintained at 34 °C. In Protocol II, all sites received 28 mM sodium nitroprusside to equalize skin blood flow between sites prior to local cooling to 20 °C (2 sites) or maintenance at 34 °C (2 sites). In both protocols individuals were then passively heated to increase core temperature to ~1 °C. Both decreased skin blood flow and decreased local temperature attenuated the slope of the SR to mean body temperature relationship (2.0 ± 1.2 vs. 1.0 ± 0.7 (mg cm⁻² min⁻¹)/°C for the effect of decreased skin blood flow, P = 0.01; 1.2 ± 0.9 vs. 0.07 ± 0.05 (mg cm⁻² min⁻¹)/°C for the effect of decreased local temperature, P = 0.02). Furthermore, local cooling delayed the onset of sweating (mean body temperature of 37.5 ± 0.4 °C vs. 37.6 ± 0.4 °C, P = 0.03). These data demonstrate that local cooling attenuates sweating by independent effects of decreased skin blood flow and decreased local skin temperature.

Citation

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Skin Surface Cooling Improves Orthostatic Tolerance Following Prolonged Head-Down Bed Rest

Author
David M. Keller, David A. Low, Scott L. Davis, Jeff Hastings, Craig G. Crandall

Abstract
Prolonged exposure to microgravity, as well as its ground-based analog, head-down bed rest (HDBR), reduces orthostatic tolerance in humans. While skin surface cooling improves orthostatic tolerance, it remains unknown whether this could be an effective countermeasure to preserve orthostatic tolerance following HDBR. We therefore tested the hypothesis that skin surface cooling improves orthostatic tolerance after prolonged HDBR. Eight subjects (six men and two women) participated in the investigation. Orthostatic tolerance was determined using a progressive lower-body negative pressure (LBNP) tolerance test before HDBR during normothermic conditions and on day 16 or day 18 of 6° HDBR during normothermic and skin surface cooling conditions (randomized order post-HDBR). The thermal conditions were achieved by perfusing water (normothermia ~34°C and skin surface cooling ~12–15°C) through a tube-lined suit worn by each subject. Tolerance tests were performed after ~30 min of the respective thermal stimulus. A cumulative stress index (CSI; mmHg LBNP-min) was determined for each LBNP protocol by summing the product of the applied negative pressure and the duration of LBNP at each stage. HDBR reduced normothermic orthostatic tolerance as indexed by a reduction in the CSI from 1,037 ± 96 mmHg·min to 574 ± 63 mmHg·min (P < 0.05). After HDBR, skin surface cooling increased orthostatic tolerance (797 ± 77 mmHg·min) compared with normothermia (P < 0.05). While the reduction in orthostatic tolerance following prolonged HDBR was not completely reversed by acute skin surface cooling, the identified improvements may serve as an important and effective countermeasure for individuals exposed to microgravity, as well as immobilized and bed-stricken individuals.

Citation

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Heat-Stress-Induced Changes in Central Venous Pressure Do Not Explain Interindividual Differences in Orthostatic Tolerance During Heat Stress

Author
R. Matthew Brothers, David M. Keller, Jonathan E. Wingo, Matthew S. Ganio, Craig G. Crandall

Abstract
The extent to which heat stress compromises blood pressure control is variable among individuals, with some individuals becoming very intolerant to a hypotensive challenge, such as lower body negative pressure (LBNP) while heat stressed, while others are relatively tolerant. Heat stress itself reduces indexes of ventricular filling pressure, including central venous pressure, which may be reflective of reductions in tolerance in this thermal condition. This study tested the hypothesis that the magnitude of the reduction in central venous pressure in response to heat stress alone is related to the subsequent decrement in LBNP tolerance. In 19 subjects, central hypovolemia was imposed via LBNP to presyncope in both normothermic and heat-stress conditions. Tolerance to LBNP was quantified using a cumulative stress index (CSI), and the difference between normothermic CSI and heat-stress CSI was calculated for each individual. The eight individuals with the greatest CSI difference between normothermic and heat-stress tolerances (LargeDif), and the eight individuals with the smallest CSI difference (SmallDif), were grouped together. By design, the difference in CSI between thermal conditions was greater in the LargeDif group (969 vs. 382 mmHg × min; P < 0.001). Despite this profound difference in the effect of heat stress in decreasing LBNP tolerance between groups, coupled with no difference in the rise in core body temperatures to the heat stress (LargeDif, 1.4 ± 0.1°C vs. SmallDif, 1.4 ± 0.1°C; interaction P = 0.89), the reduction in central venous pressure during heat stress alone was similar between groups (LargeDif: 5.7 ± 1.9 mmHg vs. SmallDif: 5.2 ± 2.0 mmHg; interaction P = 0.85). Contrary to the proposed hypothesis, differences in blood pressure control during LBNP are not related to differences in the magnitude of the heat-stress-induced reductions in central venous pressure.

Citation

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Heat Stress Attenuates the Increase in Arterial Blood Pressure During the Cold Pressor Test

Author
Jian Cui, Manabu Shibasaki, David A. Low, David M. Keller, Scott L. Davis, Craig G. Crandall

Abstract
The mechanisms by which heat stress impairs the control of blood pressure leading to compromised orthostatic tolerance are not thoroughly understood. A possible mechanism may be an attenuated blood pressure response to a given increase in sympathetic activity. This study tested the hypothesis that whole body heating attenuates the blood pressure response to a non-baroreflex-mediated sympathoexcitatory stimulus. Ten healthy subjects were instrumented for the measurement of integrated muscle sympathetic nerve activity (MSNA), mean arterial blood pressure (MAP), heart rate, sweat rate, and forearm skin blood flow. Subjects were exposed to a cold pressor test (CPT) by immersing a hand in an ice water slurry for 3 min while otherwise normothermic and while heat stressed (i.e., increase core temperature ~0.7°C via water-perfused suit). Mean responses from the final minute of the CPT were evaluated. In both thermal conditions CPT induced significant increases in MSNA and MAP without altering heart rate. Although the increase in MSNA to the CPT was similar between thermal conditions (normothermia: Δ14.0 ± 2.6; heat stress: Δ19.1 ± 2.6 bursts/min; P = 0.09), the accompanying increase in MAP was attenuated when subjects were heat stressed (normothermia: Δ25.6 ± 2.3, heat stress: Δ13.4 ± 3.0 mmHg; P < 0.001). The results demonstrate that heat stress can attenuate the pressor response to a sympathoexcitatory stimulus.

Citation

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α-Adrenergic vasoconstrictor responsiveness is preserved in the heated human leg

Author
David M. Keller, Mikael Sander, Bente Stallknecht, Craig G. Crandall

Abstract
This study tested the hypothesis that passive leg heating attenuates alpha-adrenergic vasoconstriction within that limb. Femoral blood flow (FBF, femoral artery ultrasound Doppler) and femoral vascular conductance (FVC, FBF/mean arterial blood pressure), as well as calf muscle blood flow (CalfBF, 133Xenon) and calf vascular conductance (CalfVC) were measured during intra-arterial infusion of an alpha1-adrenoceptor agonist, phenylephrine (PE, 0.025 to 0.8 μg/kg/min) and an alpha2-adrenoceptor agonist, BHT-933 (1.0 to 10 μg/kg/min) during normothermia and passive leg heating (water perfused pant leg). Passive leg heating (~46 °C water temp) increased FVC from 4.5±0.5 to 11.9±1.3 ml/min/mmHg (P < 0.001). Interestingly, CalfBF (1.8±0.2 vs 2.8±0.3 ml/min/100g) and CalfVC (2.0±0.3 vs 3.9±0.5 ml/min/100g/mm Hg*100) were also increased by this perturbation (P<0.05 for both). Infusion of PE and BHT-933 resulted in greater absolute decreases in FVC during leg heating compared to normothermic conditions (maximal decreases in FVC during heating vs. normothermia: PE: 7.8±1.1 vs 2.8±0.5; BHT-933: 8.6±1.7 vs 2.1±0.4 ml/min/mmHg; P<0.01 for both). However, the nadir FVC during drug infusion was higher during passive leg heating compared to normothermic conditions (FVC at highest dose of respective drugs during heating vs. normothermic conditions: PE: 3.7±0.4 vs 2.0±0.3; BHT-933: 3.8±0.2 vs 2.1±0.3 ml/min/mmHg; P<0.001 for both). Leg heating did not alter the responsiveness of CalfBF or CalfVC to either PE or BHT-933. Taken together, these observations suggest that local heating does not decrease alpha-adrenergic responsiveness. However, heat-induced vasodilation opposes alpha-adrenergic vasoconstriction. Furthermore, passive heating of a limb causes not only an increase in skin blood flow but also in muscle blood flow.

Citation

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March 2011

Long-Term Post-Pneumonectomy Pulmonary Adaptation Following all-trans-retinoic Acid Supplementation

Author
Priya Ravikumar, D. Merrill Dane, Paul McDonough, Cuneyt Yilmaz, Aaron S. Estrera, Connie C. W. Hsia

Abstract
In adult dogs following right pneumonectomy (PNX) and receiving all-trans-retinoic acid (RA) supplementation for 4 mo, we found modestly enhanced alveolar-capillary growth in the remaining lung without enhanced resting lung function (J Appl Physiol 96: 1080–1089 and 96: 1090–1096, 2004). Since alveolar remodeling progresses beyond this period and the lipid-soluble RA continues to be released from tissue stores, we hypothesized that RA supplementation may exert additional long-term effects. To examine this issue, adult male litter-matched foxhounds underwent right PNX followed by RA supplementation (2 mg/kg po 4 days/wk, n = 6) or placebo (n = 4) for 4 mo. Cardiopulmonary function was measured at rest and during exercise at 4 and 20 mo post-PNX. The remaining lung was fixed under a constant airway pressure for morphometric analysis. Comparing RA treatment to placebo controls, there were no differences in aerobic capacity, cardiopulmonary function, or lung volume at rest or exercise. Alveolar-capillary basal lamina thickness and mean harmonic thickness of air-blood diffusion barrier were 23–29% higher. The prevalence of double-capillary profiles remained 82% higher. Absolute volumes of septal interstitium, collagen fibers, cells, and matrix were 32% higher; the relative volumes of other septal components and alveolar-capillary surface areas expressed as ratios to control values were up to 24% higher. Thus RA supplementation following right PNX modestly and persistently enhanced long-term alveolar-capillary structural dimensions, especially the deposition of interstitial and connective tissue elements, in such a way that caused a net increase in barrier resistance to diffusion without improving lung mechanics or gas exchange.

Citation

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Visualizing Economic Development with ArcGIS Explorer

Author
Megan L. Webster, Andrew J. Milson

Abstract
Numerous educators have noted that Geographic Information Systems (GIS) is a powerful tool for social studies teaching and learning. Yet the use of GIS has been hampered by issues such as the cost of the software and the management of large spatial data files. One trend that shows great promise for GIS in education is the move to cloud computing. The "cloud" refers to a virtual network that provides many users with access to files, services, and applications. The Environmental Systems Research Institute (Esri) recently released a GIS application called ArcGIS Explorer that takes advantage of cloud computing to deliver a virtual GIS environment. Once the free application is downloaded, students and teachers can interact with maps by performing common GIS tasks, such as adding or subtracting layers, zooming in and out, panning, and identifying features. One of the most exciting features of this tool is the ability to capture a series of maps and build a presentation. In this article, the authors describe how they used ArcGIS Explorer with ninth-grade geography students to study economic development and the ways in which countries are classified as more, or less, developed. (Contains 1 figure and 9 notes.)

Citation

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Heart rates of elementary physical education students during dancing classrooms activities

Author
Larry P. Nelson, Melissa Evans, Wendy Guess, Mary Morris, Terry Olson, John Buckwalter

Abstract
We examined how different types of dance activities, along with their duration, influenced heart rate responses among fifth-grade physical education students (N = 96) who participated in the Dancing Classrooms program. Results indicated that the overall Dancing Classrooms program elicits a moderate cardiovascular heart rate response (M = 124.4 bpm), in which 47% of class time was spent above a 60% maximal heart rate threshold. The swing dance in particular (M = 143.4 bpm) stimulated a much higher heart rate level than all other dances in the program, with a mean heart rate change of 52.6 bpm. Girls (127.3 bpm) achieved marginally higher heart rates (p = .059) than boys (121.1 bpm).

Citation
Nelson, L. P., Evans, M., Guess, W., Olson, T., & Buckwalter, J. (2011). Heart rates of elementary physical education students during dancing classrooms activities. Research Quarterly for Exercise and Sport. 82(2) 256-263.

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Simultaneous 3D Imaging of Bone and Vessel Microstructure in a Rat Model

Author
Max Langer, Rhonda Prisby, Zsolt Peter, Alain Guignandon, Marie-Hélène Lafage-Proust, Françoise Peyrin

Abstract
Analysis of bone microvascularization has generally been performed from 2D histology. The method proposed in this study enables for the first time to simultaneously analyze, in 3D, the microvascularization and bone microstructure in a rat model. The method is based on the use of quantitative synchrotron micro-computed tomography (SR-μCT) coupled to an automatic image analysis procedure. It was applied to investigate the effect of intermittent parathyroid hormone (PTH) administration on angiogenesis and osteogenesis in rats. Rats were posthumously injected with a contrast agent and subsequently imaged. The algorithm allowed the reconstruction and the segmentation of both bone microstructure and microvascularization in cortical and trabecular regions. A large set of 3D quantitative parameters was then extracted from the bone and vascular networks. In particular, we propose a new parameter, utilizing the availability of both microstructures to relate the two, which we dub the vascular-trabecular interdistance (VTI). Due to the short acquisition times of SR-μCT and the efficiency of the image analysis algorithm, a large data set was analyzed, which permitted statistical analysis of the measured parameters. Statistical analysis confirmed that treatment with PTH significantly modulated several bone and vessel parameters, including the VTI.

Citation

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The Use of a Tactile-Vision Sensory Substitution System as an Augmentative Tool for Individuals with Visual Impairments

Author
Michael D. Williams, Christopher T. Ray, Jennifer Griffith, William De L’Aune

Abstract
The promise of novel technological strategies and solutions to assist persons with visual impairments (that is, those who are blind or have low vision) is frequently discussed and held to be widely beneficial in countless applications and daily activities. One such approach involving a tactile-vision sensory substitution modality as a mechanism to compensate for vision loss likewise holds such promise. The purpose of this study was to test the effectiveness of the BrainPort vision device system in helping the participants acquire accurate information about the shapes of presented objects at various distances. The BrainPort vision device system--Wicab, BP-WAVE2007--consists of a postage stamp-sized 25 x 25 electrotactile electrode array for the tongue (625 individual pinhead-sized points of contact arranged across the face of the array), a control box, a digital video camera, and a handheld controller for zoom and contrast inversion. BrainPort technology converts images that are captured through a digital camera and presents this information to the brain via electrical stimulation of the tongue through the electrotactile electrode array, augmenting normal sensory channels with this additional spatial information (Arnoldussen & Hoge, 2008). (Contains 1 figure and 3 tables.)

Citation

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Balance Performance With a Cognitive Task: A Continuation of the Dual-Task Testing Paradigm

Author
Jacob E. Resch, Bryson May, Phillip D. Tomporowsky, Michael S. Ferrara

Abstract
To ensure that concussed athletes return to play safely, we need better methods of measuring concussion severity and monitoring concussion resolution. Objective: To develop a dual-task model that assesses postural stability and cognitive processing in concussed athletes. Design: Repeated measures study. Setting: University laboratory. Patients or Other Participants: Twenty healthy, college-aged students (10 men, 10 women; age = 20 ± 1.86 years, height = 173 ± 4.10 cm, mass = 71.83 ± 35.77 kg). Intervention(s): Participants were tested individually in 2 sessions separated by 2 days. In one session, a balance task and a cognitive task were performed separately. In the other session, the balance and cognitive tasks were performed concurrently. The balance task consisted of 6 conditions of the Sensory Organization Test performed on the NeuroCom Smart Balance Master. The cognitive task consisted of an auditory switch task (3 trials per condition, 60 seconds per trial). Main Outcome Measure(s): For the balance test, scores for each Sensory Organization Test condition; the visual, vestibular, somatosensory, and visual-conflict sub-scores; and the composite balance score were calculated. For the cognitive task, response time and accuracy were measured. Results: Balance improved during 2 dual-task conditions: fixed support and fixed visual reference (t<sub>18</sub> = 2.34, P < .05) and fixed support and sway visual reference (t<sub>18</sub> = 2.72, P = .014). Participants' response times were longer (F<sub>1,18</sub> = 67.77, P < .001, η<sup>2</sup> = 0.79) and choice errors were more numerous under dual-task conditions than under single-task conditions (F<sub>1,18</sub> = 5.58, P = .03, η<sup>2</sup> = 0.24). However, differences were observed only during category-switch trials. Conclusions: Balance was either maintained or improved under dual-task conditions. Thus, postural control took priority over cognitive processing when the tasks were performed concurrently. Furthermore, dual-task conditions can isolate specific mental processes that may be useful for evaluating concussed individuals.

Citation

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Author
Marc Schwartz, Jeanne Gerlach

Abstract
We describe the emergence of a new field, Mind Brain and Education, dedicated to the science of learning, as well as the roles researchers, policy makers, and educators need to play in developing this collaborative effort. The article highlights the challenges that MBE faces and the strategy researchers and educators in Texas are developing to meet these challenges. In particular, through the creation of a research Schools Network, educators and researchers are creating an infrastructure to identify and test ideas critical to educators. This network builds on Dewey’s laboratory school by creating new responsibilities and partnerships. To this end we identify four critical objectives: develop a clear vision; build trusting relationships; set a standard for rigorous research and scholarship; and, promote meaningful assessment tools.

Citation

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Analyzing Learning About Conservation of Matter in Students While Adapting to the Needs of a School

Author
Marina Doucerain, Marc S. Schwartz

Abstract
We probed the impact of two teaching strategies, guided inquiry and argumentation, on students’ conceptual understanding of the conservation of matter. Conservation of matter is a central concept in middle school science curriculum and a prerequisite upon which rests more complex constructs in chemistry. The results indicate that guided inquiry was particularly effective in improving students’ conceptual understanding, as evidenced by pre/posttest results and by a skill analysis of in-depth interviews of student dyads. We also discuss how the challenges inherent to educational contexts can undermine the quality and limit the impact of empirical research carried out in many schools. We suggest how these challenges could be met in the emerging infrastructures for change called the Research Schools Network.

Citation

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