

Contact: Rachel Boon

**PROFESSIONAL DEVELOPMENT ASSIGNMENT REPORTS FOR FY2021**

**Action Requested:** Receive the professional development assignment reports submitted by the Regent universities for FY2021.

**Executive Summary:** Board Policy 2.1.R (a-e) directs the institutions to submit a yearly report of the completed professional development assignments, pursuant to the 2011 Iowa Act, Chapter 122 (HF 45).

In November 2019, the Board approved 134 professional development assignments for 2020-21. As the COVID-19 pandemic took hold, many faculty determined that they would be more able to accomplish the goals of their assignments if they deferred to a later date. At UNI, one PDA was deferred to a future term. At SUI, 18 PDAs were deferred, and seven were declined. Two PDAs that were deferred from a prior year, were taken in 2020-21 and are included in this report. At ISU, 20 PDAs were deferred, three were declined and three reduced or changed the dates of the PDA.

The estimated cost of the professional development assignment program was \$400,938 for 2020-21; however, given the large number of deferred and declined PDAs, actual costs were well below that level. During the award period faculty earned nearly \$6.7 million in grants, with \$25.6 million in grant applications pending announcement of award status, and \$6.4 million more near submission. The return on investment to the institutions and the taxpayers of Iowa in just a one year period is unparalleled.

Other results include articles published or in review, many oral presentations, dozens of book chapters or entire books in development or submitted, creative works completed or performed, certifications attained and trainings completed, and many courses updated or new courses developed.

A brief description of each professional development assignment completed in FY2021 is available in this report, including information about the value added to the students, university, and state from the assignments. This report addresses the Board of Regents Strategic Plan priority for “promoting and supporting innovation in teaching, research, and economic development” as well as “promoting effective use of resources to meet institutional missions.”

**University of Northern Iowa**

**BERENDZEN, PETER**, Professor, Biology, 16 Years of Service, Fall 2020

*Title:* Application of Genome-Wide SNP Data the Landscape Genetics of the Rainbow Darter in the Upper Mississippi River

The focus of this PDA was to utilize genome-wide SNP genotyping on individuals of rainbow darter from populations in the upper Mississippi River drainage to determine if the influence of contemporary landscape modifications on the spatial distribution of genetic diversity. Funding for the collection of these data was provided by a UNI Capacity Building Seed Grant and a Small Wildlife Diversity Grant from the Iowa DNR. Through this PDA, methodologies for analyzing large genomic datasets in the laboratory at UNI were established. This work resulted in the acceptance of a manuscript for publication and the development of new projects. This work is of value to UNI because it directly resulted in the training of graduate students in the Department of Biology in the field of landscape/riverscape genomics. It also contributed valuable research aimed at protecting and conserving Iowa's native fauna. The establishment of these techniques in the laboratory has led to new projects funded by the Iowa DNR Fisheries Research Division. These projects continue to train UNI undergraduate and graduate students.

**BULLARD, JULIA K.**, Professor, Music, 21 Years of Service, AY 2020-2021

*Title:* The Practical Application of Alexander Technique and Mindfulness Meditation to Music Pedagogy and Practice

Professor Bullard's PDA goals were: 1) to conduct a research study on the effects of a combination of mindfulness meditation practice and Alexander technique instruction; 2) to develop a pedagogical resource for music teachers and students to apply the principles of mindfulness meditation and Alexander Technique to their work; and 3) to progress toward completion of Alexander Technique teacher training program at the Minnesota Center for the Alexander Technique. Upon completion, Bullard will be a fully certified teacher of the Alexander Technique (anticipated certification in August 2022). Publication of the study is anticipated in Fall 2022. Conference proposals are being prepared for submission, a crucial means of sharing the study with the academic community and bringing recognition to UNI and the School of Music as a leader in this field. Plans for interdisciplinary collaboration on UNI's campus are in progress, including work with the UNI theater department. Finally, a new class was created and offered for the first time in Fall 2021. Bullard has developed plans for community outreach events, including activities and workshops with K-12 schools, and collaboration with health care and wellness providers in the Cedar Valley. One such activity in occurred in summer 2021, teaching Alexander Technique fundamentals in the Cedar Valley Chamber Music summer camp program.

**DeSOTO, CATHERINE**, Professor, Psychology, 20 Years of Service, Fall 2020

*Title:* Neuroendocrine Correlates of Behavior

This PDA was designed to capitalize on existing research infrastructure within the department of psychology and allowed completion of two principal goals and, as well as bringing an additional project to publication related to the current COVID-19 pandemic. The Psychoneuroendocrinology Laboratory (PNE Lab) allows for the collection and analysis of saliva for a variety of biomarkers related to psychological health and neuroendocrine functioning. The second objective was to collaborate with experts in the area of eating disturbance and plan a series of studies to test the hypothesis that certain hormones are associated with exacerbations in symptoms. This has been completed. Two articles were submitted and one was accepted, the other is being revised. Data

related to COVID-19 perceptions was analyzed, submitted and revised for publication and resulted in a peer reviewed journal publication in the North American Journal of Psychology.

**DOELY, NOAH**, Associate Professor, Art, 9 Years of Service, Fall 2020

*Title:* A Risograph Book Project

Professor Doely completed the photographs and layout for the planned publication “Primary” in partnership with the Penumbra Foundation in New York City. Throughout this process, he staged photographs for the book, traveled to capture other site-specific images, did research about color history and perception, experimented with different kinds of papers, and worked on the layout of the book. Doely also spent time researching the 19th century cyanotype process, gaining a deeper understanding of it. In addition to the book layout, he also completed an edition of 100 cyanotype photographs included with each copy of the book and a series of related large-scale cyanotypes. This is knowledge he has used in his photography classes at UNI as well as workshops for outreach and engagement with the Iowa community at venues such as at Three Pines Farm, a folk school near Denver, Iowa, as well as places outside of Iowa such as Mildred’s Lane, an experimental residency in rural Pennsylvania, and the Penumbra Foundation in New York City.

**DuBORD, ELISE E.**, Associate Professor, Languages and Literatures, 7 Years of Service, Fall 2020

*Title:* Migration and Language in Puerto Rico: The Role of Transnationalism in Shaping Bilingualism

This qualitative research examines the intersection of language and the Latinx experience in Iowa during the COVID-19 pandemic. Beginning in October 2020, semi-structured interviews lasting one to two hours were conducted via video conferencing (e.g. Zoom) in English, Spanish or both according to participants' preferences. Focal group participants were college graduates in their 20s (i.e. Millennials) who had grown up in Iowa or had come at a young age; all focal group participants had at least one parent who had emigrated to the U.S. from Latin America. Latinx Millennials in the focal group held white collar jobs that allowed them to work from home during the pandemic. In contrast, many of their parents had jobs that had to be completed on site (e.g. meat packing, factory work, cleaning), putting them at greater risk for contracting COVID-19. Millennials wanted to guide, help and protect their parents through the pandemic (e.g. translating COVID-19 guidelines, accessing healthcare services, providing supplemental income). Simultaneously, they wanted to carve out spaces for themselves in ways that facilitated upward mobility and greater separation from family. They grappled with language and cultural maintenance as a powerful link to family, while contemplating which aspects of their own upbringing they will take with them into adulthood. This research is particularly beneficial to UNI because of its focus on the educational and professional develop of Latinx Millennials, which is invaluable at an institutional level for supporting the postsecondary experiences of first generation Latinx students. Findings from this research will be integrated into courses on Latinos in the U.S. and Spanish in the U.S.

**HITLAN, ROBERT T.**, Professor, Psychology, 19 Years of Service, Spring 2021

*Title:* Psychological, Physiological, and Biological Implications of Being Ostracized by Ingroup Versus Outgroup Members Utilizing a Stress and Coping (Challenge Versus Threat) Theoretical Framework

This PDA project proposed accomplishing two objectives. The first objective involved writing up two manuscripts for publication in peer-reviewed journals. The first manuscript examined the

relations among social ostracism, neuroendocrine responses and psychological health. This manuscript has been submitted for publication and is currently under review. The second manuscript examined additional personality and health-related response patterns related to social ostracism; it has been completed and publication outlets are being considered. The second objective was to further develop collaborative relationships with experts in the area of social ostracism. Specifically, linguistic ostracism occurs when an individual is ostracized by others speaking a language that the target has extremely limited or no ability to understand. Currently little is known about how such experiences influence activation of internal biological and physiological response systems when compared to more traditional (non-linguistic) ostracism. To this end, Hitlan had numerous meetings with experts in this area and is continuing to collaborate on the design of a series of research studies.

**JERÓNIMO, HEATHER**, Associate Professor, Languages and Literatures, 7 Years of Service, Spring 2021

*Title:* The Expanding Spanish Family: Redefining Familial Relationships in 20<sup>th</sup> and 21<sup>st</sup> Century Spanish Narrative Film

Performing Parenthood: Non-Normative Fathers and Mothers in 20th and 21st - Century Spanish Narrative and Film is a book that seeks to change the conversation about the 20th and 21st - century Spanish family by bringing visibility to literary and cinematic examples of alternative Spanish families, providing an informative glimpse into an evolving society influenced by national and global changes. This book explores the multiplicity within non-normative family construction, the ways in which those families' subversive actions lead to fulfillment or not, and how literary and cinematic portrayals of the changing Spanish family reflect anxieties and hopes about shifting gender roles, as well as political, economic and cultural realities. Jerónimo updated chapters written previously, wrote an entirely new chapter, and created a new introduction. Jerónimo will send the manuscript to the University of Toronto Press by the end of September 2021 for a final publication decision.

**LIANG, BINGQING**, Associate Professor, Geography, 10 Years of Service, Spring 2021

*Title:* Urban Landscape Characterization Using Hyperspectral Imaging

This project explored the capabilities of the technology of hyperspectral imaging (HI) in characterizing detailed urban landscape features based on the campus of UNI. Specifically, it aimed to extract road and roofing materials by integrating the hyperspectral and thermal images and to incorporate the hyperspectral image in reducing volume of the Light Detection and Ranging (LiDAR) data, an emerging dataset commonly used to generate three-dimensional (3D) models for urban environments. A total of 231GB data were processed to derive different variables including 16 vegetation indexes, five minimum noise fraction bands, and five principal components bands from the hyperspectral image, while 6 topographic variables were extracted from the LiDAR data (e.g., surface roughness, hillshade, and intensity). Knowledge learned and materials gathered from this project were used to update a more comprehensive curricular focusing on HI and LiDAR along with the existing advanced-level remote sensing technology course (GEOG 4380/5380 – Digital Image Processing), which enhanced the curriculum in related core science and technology areas as well as supported undergraduate and graduate education that connects to applied and experiential learning at UNI. The research generated a detailed urban surface feature map critical on the understanding of road and building maintenance, energy efficiency, city micro-climate, and urban sustainable design, which are within the interests of local Iowan and thus provides them with key points for policy-making and real-world practice in related topics.

**SKAAR, NICOLE**, Associate Professor, Educational Psychology, Foundations and Leadership Studies, 10 Years of Service, Spring 2021

*Title:* An Investigation of “Counseling as a Related Service” Usage Across the United States.

The goal of the project was to study how special education professionals memorialize mental health services within individualized education plans for students who have disabilities that require these services to receive their free and appropriate public education. Skaar was able to use this new learning in teaching to benefit students and their learning. This work will inform Iowa educators about their current practice and may lead to improvement of practice in writing plans that better support student mental health.

**SOANS, FRANCESCA**, Associate Professor, Communication & Media, 16 Years of Service, Fall 2020

*Title:* The North End

The North End is a 60-minute video documentary (work-in-progress) on the history and meanings of the North End, an area located in the north of Waterloo, Iowa, within the larger histories of African Americans in Waterloo and Iowa. Through the memories of former and current residents, it reconstructs the importance of this area, exploring the economic, cultural and social history of Waterloo. This is the third episode in a groundbreaking documentary series *Waterloo: A History of Place* that offers a unique perspective on Waterloo’s diverse histories, refracted through the prism of place. A further edit of the documentary was completed, drawing from over 80 hours of video footage and archival visual material and incorporating new material shot in recent years. Using some of this material, an additional 60-minute video documentary, *Getting That Note Out*, exploring the story of an African American woman guitarist from Waterloo, was completed and premiered virtually at the Gallagher Bluedorn Performing Arts Center and screened at the University Film and Video Association conference in 2021. As a community history project, it fits within the University’s strategic goals of diversity and community engagement by contributing to the knowledge and understanding of local histories and communities, in particular the African-American community. It fostered professional mentorship opportunities for students in the production and postproduction (editing) phases and contributed to curriculum development in documentary production. The project has made an invaluable contribution to the preservation of African American history, a history that has been lost over the past few decades with the disappearance of generations. It serves as an important resource regarding the history of Waterloo and the history of African Americans in Iowa.

**STEINTHOSDOTTIR, OLOF B.**, Associate Professor, Mathematics, 10 Years of Service, Spring 2021 (originally schedule for Fall 2020 – postponed due to COVID)

*Title:* Cognitively Guided Instruction in International Settings

The goal of the Cognitively Guided Instruction in International Settings was to determine if the typology of story problems and the framework on development of students’ strategies reported by Cognitively Guided Instruction (CGI) is generalizable to students in a different cultural and linguistic educational setting than the United States. Students were interviewed and asked to solve a series of story problems related to addition, subtraction, multiplication and division. When the coding is completed and analysis of student thinking completed, the results of this study will be compared to the existing CGI research to identify similarities and differences. The results of this study can provide our pre-service and practicing teachers with tools to support the mathematical development of students that speak languages other than English or are from different cultural backgrounds. At UNI, CGI is addressed in the Mathematics Method courses and Mathematics content courses for Elementary Teaching majors. The information from the study

will add to the discussion about generalizability about students' thinking and how CGI can be used with a culturally diverse population. Additionally, the results of this study will be used in a professional development program about CGI that Steinhosdottir will provide to teachers.

**SWAZO, ROBERTO**, Professor, School of Applied Human Sciences, 15 Years of Service, Fall 2020

*Title:* Bilingual Microfictions, Quotes, Sayings, and Morals with Accompanying Interventions and Strategies for Counselors, Psychologists, and Social Workers

Fall 2020 served to complete the initial phase of the PDA project which consisted of four writing phases. Phase I (Fall 2020), composition of all microfictions, Phase II (Spring 2021), development of exercises for microfictions, Phase III (Summer 2021), selection of all quotes and sayings with accompanying exercises, and Phase IV (Fall 2021), translation of all microfictions, quotes, sayings, clinical exercises and final submission. This book project entitled Narrative Therapy with Spanish Speakers: Creative Bilingual Strategies for Individual, Family, and Group Sessions adds to the multilingual and multicultural efforts of the university to reflect an increasingly diverse student population. This book can be used by other UNI departments such as Spanish, Social Work, Psychology and Education. It provides an opportunity for interdepartmental synergy. This work benefits the citizens of Iowa because it can be used as a clinical resource for human service providers (i.e., counselors, social workers, psychologists, family therapists) who are in the field working with Spanish speaking clients. Moreover, this book/manual can be utilized by non-profit agencies as well as local school districts which would like to engage more effectively new immigrants from Latin America in the state of Iowa who have social, academic, career, psychological and emotional needs. Hence, Spanish speaking clients of all ages, including families, can be better assisted through the sociocultural integration and adaptation process. Finally, this book/manual serves as a learning tool for native English speakers who have a basic knowledge of the Spanish language and want to expand their clinical repertoire and vocabulary in Spanish to be better multicultural and multilingual human service providers.

**ZHU, JIN**, Professor, Technology, 16 Years of Service, Fall 2020

*Title:* Cyber Physical System for Crop Stress Monitoring and Disease Detection in Smart Farming

In this project, cyber physical system (CPS) technology for agriculture related applications was studied. A system of smart sensing and monitoring that integrates computing, actuations and control, communications, and sensing components together to tightly interact with the physical world, is considered as a cyber physical system. As a critical component to the Internet of Things (IoT), a CPS connects to the cloud through networking and can provide real-time information to the user. Desired features of the CPS node for this project include low cost, low power consumption, and wireless connection capabilities. RPi Zero w and Arduino Nano WiFi 1010 were chosen due to their low cost, small size and wireless connection capabilities. A prototype of the cyber physical system that connects multiple sensors to an Arduino board and powered by a rechargeable battery was designed. The battery can be charged through a USB port during the development stage or charged through a flexible thin solar panel alternatively when deployed outdoors. The system can monitor the temperature, humidity, soil moistures, light level and transmit the data back to the Internet periodically through wireless local area network. In addition, a high precision camera was used to take plant pictures. The pictures transmitted to the cloud are used for further analysis. The research has helped better understand the potential of CPS applications for smart farming in the state of Iowa and has the potential to benefit the agriculture business. The research also provided a new platform for student research at UNI.

**University of Iowa**

**BECKERMANN, CHRISTOPH**, professor, Mechanical Engineering, 32 years of service, Fall 2020

*Title:* Modeling of Solidification

Metal casting is an industry that is worth several hundred billion dollars in the U.S. alone. Understanding solidification of metal castings is crucial for controlling the microstructure and properties of cast metals and the formation of defects in solidified materials. During the PDA, Professor Beckermann worked on a book on mathematical modeling and computer simulation of solidification of metal alloys. The book is based on the more than 30 years of research that he and others have performed in this area. He edited the first part of the book covering the fundamentals and governing equations and added chapters on applications and specific examples. The book will be a primary reference for researchers in the field of solidification modeling. It will be useful for graduate students and practicing engineers in the casting industry.

**BIANCHI, ALISON J**, associate professor, Sociology, 12 years of service, Fall 2020

*Title:* Sentiments as Status Processes: An Expectation States Approach

Due to the pandemic, data collection for Professor Bianchi's NSF project was suspended. However, Bianchi took advantage of her PDA by writing a grant proposal extension for the project, which included a request for more research funds. The proposal was successful, as NSF awarded Bianchi with more funding for her project and a year's extension. Bianchi and her graduate students then re-worked the project's Python 3.9 computer protocol, which will be used for data collection, adding accessibility features and platform enhancements with GitHub. Working with her colleagues, Bianchi then wrote and submitted three journal articles to Social Science Research, Journal of Human Performance in Extreme Environments, and American Sociological Review. Bianchi also enhanced her professional development by taking online courses involving cutting-edge research methodologies and computing skills. The impact on her research will be immediate: upgrading her skills and developing a new theory for the expectation states tradition will open avenues not realized prior to this PDA period. The impact on her teaching will be immediate, as she teaches courses in methods and groups.

**BORK, ROBERT**, professor, Art & Art History, 21 years of service, Fall 2020

*Title:* Geometrical Design Principles in Art: Case Studies from Gothic Architecture and Premodern Painting

Professor Bork specializes in the study of European medieval architecture, with particular emphasis on Gothic churches. Over the course of fall semester 2020, while on PDA, he wrote four articles and two book reviews, all of which have been accepted for publication. In October, he gave an hour-long talk via Zoom to a French conference on architectural drawings, setting the stage for the placement of one of his articles in the leading journal *Bulletin monumental*. With the help of an undergraduate assistant, he built a new website that helps to make his previous and ongoing research projects on the geometry of architecture and painting available to a global audience. In addition, he developed a new course on the art and architecture of the Islamic world, addressing a longstanding curricular need.

**BOWMAN, NICHOLAS A**, professor, Educational Policy and Leadership, 4 years of service, Fall 2020

*Title:* A Large-Scale Approach for Improving College Student Success and Equity

Professor Bowman's research examined the impact of the classroom environment and an online activity that is designed to promote college students' belonging, academic achievement, retention

and graduation. This work focused on students who planned to major in science, technology, engineering and mathematics (STEM) and on courses in STEM departments, since STEM graduates are in high demand, but many students do not persist and graduate in STEM majors. This research has resulted in an article accepted in a highly prestigious journal (Science Advances) and multiple other papers that are currently under review for publication. This research will be incorporated into Bowman's teaching, including coursework during this summer and fall. The findings from this work could inform strategies to improve STEM student success within the University of Iowa, the state of Iowa and beyond.

**BUCKLEY, JENNIFER A**, associate professor, English, 6 years of service, Fall 2020  
*Title: Act Without Words: Speechless Performance on Modern Stages*

Professor Buckley conducted both primary and secondary research for her book manuscript, 'Act Without Words: Speechless Performance on Modern Stages.' In place of archival research, which became impossible under pandemic conditions, Buckley interviewed living artists whose work features prominently in the manuscript. She also engaged in secondary research using available digital resources. Among the works studied are major performance works with roots in Iowa; the manuscript highlights the long history of world-class artistic creation in the state. Further, Buckley drafted roughly 30% of two chapters. This research investigates how modern theater artists think about and create "languages" of movement and gesture to communicate aspects of human experience which they feel speech cannot access. The project relates directly to performance techniques taught in theatre arts, dance, rhetoric and intermedia courses, among others.

**CARR, LUCAS**, associate professor, Health & Human Physiology, 7 years of service, Fall 2020  
*Title: Improving Physical Activity Behavior Among At-risk Populations*

The purpose of this PDA was to allow Professor Carr to advance his scholarly work. In the original PDA application, Carr proposed submitting two manuscripts for publication and two external grants to support future research. Instead, Carr submitted seven manuscripts during his PDA, two of which have received favorable reviews and will be accepted for publication in the coming weeks. The remaining five manuscripts are still under review. Carr was the principal investigator on three external grant applications which, if funded, will provide a large number of cancer survivors in the state of Iowa with health promotion resources. This award also provided Carr time to refine two courses he teaches on topics related to obesity and physical activity promotion. Finally, Carr spent part of his PDA developing a new Community Health Teaching Center which will provide UI students with experiential learning opportunities.

**CHEN, SHUANG**, associate professor, History, 9 years of service, Fall 2020  
*Title: Redefining Property Rights in Manchuria, 1880s-1920s*

During the award period, Professor Chen conducted research for her second book project, entitled "Redefining Property Rights in Manchuria, 1880s-1920." As a Fellow-in-Residence of the Obermann Center for Advanced Studies, she participated in the biweekly virtual seminar of the center and analyzed the archival sources she collected during previous research trips in China. By the end of the award period, she was in the process of writing two articles: "Tenancy, Property Rights, and Social Transformation in Manchuria, 1880s-1920s," being prepared for submission to a peer-reviewed journal, and "Demography of Qing China," to be submitted to the Oxford Research Encyclopedia of Asian History. The research for the book will produce new materials for Chen's graduate and undergraduate courses. It will also further the understanding of the economic system of China and its people's economic behaviors in the past and present.

**CONSTANTINESCU, SERBAN G**, professor, Civil-Environmental Engineering, 16 years of service, Spring 2021

*Title:* Eco-hydraulics of River Streams: An Integrated Numerical and Experimental Approach

Professor Constantinescu used his PDA to carry out research aimed at understanding and quantitatively describing the hydrodynamics and transport processes in fluvial systems and their relevance for river ecology, sustainability and flood mitigation. The main topics of this research were studying flow-plant interactions, erosion mechanisms and shallow wake structure in streams containing patches of vegetation, effects of temperature stratification and bed discordance on flow and mixing at river confluences which are critical elements of drainage networks, hydrodynamics of streams containing mussel beds which play a critical role as ecological engineers', resistance of river beds containing macroroughness elements and development of new design formulas to be used for protection of bridge abutments against flood-induced scour. During his PDA, Constantinescu published several journal papers and submitted several others. Two journal papers are under preparation for Nature Geosciences. The course developed and taught at ETH will be used as the main teaching material for a new module of CEE 6299 "Advanced topics in water and the environment" covering around 1/3 of a semester.

**CURTU, RODICA**, professor, Mathematics, 12 years of service, Fall 2020

*Title:* Neural-Inspired Models of Auditory Category Learning

Perception, as the mental representation of environmental stimuli, plays a critical role in humans' lives. Computational models that link sensory stimuli to percepts and their neural representations, provide important insights into the underlying mechanisms of perception. In this project, Professor Curtu built two neural-inspired models. She constructed a data-driven model for auditory perceptual bi-stability using neuronal and behavioral recordings obtained during an auditory task. The researcher found that neural signals from the primary auditory cortex encode both properties of the stimulus and perception driven features. She used these results to demonstrate how changes in neuronal activity led to perceptual switches. Curtu also proposed a drift-diffusion model that accurately captures changes in behavior during a cognitive task when subjects estimate second-long time intervals following a cue. This project will produce two journal articles and new teaching material for a graduate course in applied mathematics. A grant proposal will be submitted for review by the National Science Foundation.

**DASGUPTA, SOURA**, professor, Electrical-Computer Engineering, 30 years of service, Spring 2021

*Title:* Control and Machine Learning Algorithms for Parkinson's Disease

Professor Dasgupta worked on a novel technique that diagnoses Parkinson's disease (PD) using four minutes of EEG data and developed mathematical models of PD that have the potential to aid Adaptive Deep Brain Stimulation (DBS) for adaptively stimulating the brain to relieve PD symptoms. He developed an index that is highly correlated with MoCA, an index used to measure cognitive impairment. Depression in PD patients goes undiagnosed. He developed an index that diagnoses such depression. He developed a theory for adjusting model parameters for matching neurological signals without an exhaustive search. He used his EEG index to show that it can distinguish between DBS on and off states, and thus can act as a noninvasive trigger for ADBS. This work lays the foundation for future cutting-edge research on PD and his own research agenda. The EEG based methods are of special import to Iowa as there is a paucity of neurologists in rural areas. Compared to other diagnostic tools for PD, these methods are particularly cheap and EEG machines are readily available to a rural physician. Further, the diagnostic process is fast, automated and does not require expert input.

**DILLEY, PAUL C**, associate professor, Religious Studies, 7 years of service, Spring 2021  
*Title:* Biographies of Saints and Graeco-Roman Popular Theater: A Theory of Ancient Christian Comedy

During his PDA semester Professor Dilley conducted research towards his second book, tentatively entitled "Hagiography and Graeco-Roman Theater: Mime, Comedy, and the Therapy of Emotions," which identifies a group of ancient Christian saints' lives that adapted classical tragicomedy for pious audiences and provides translations of them from four different languages. He is currently in talks with editors for publication, preferably through open access. He also worked on other long term research projects, especially concerning Manichaeism, sometimes considered the first world religion, preparing various articles, chapters and edited volumes for publication. Dilley will discuss his research on early Christian saints' lives and Manichaeism in undergraduate classes (e.g. Judaism, Christianity, and Islam) and graduate seminars (e.g. Advanced Greek and Latin). His work on his new website, Global Writing Cultures, to be released publicly as a prototype in fall 2021, will provide a convenient searchable resource for studying the spread and development of writing across the pre-modern world, which could be used in Iowa secondary schools and by interested citizens.

**ERIVES, ALBERT J**, associate professor, Biology, 7 years of service, Spring 2021  
*Title:* Establishing the Tribolium System to Study Hearing-related Genes

Professor Erives established a new animal model to study antenna-development and hearing-related genes in Tribolium and related beetles from the Tenebrionidae family. The tenebrionid beetles encode counterparts to all human trans-membrane channel (TMC) proteins, which are involved in mechanotransducing sensory functions. Erives accomplished the successful rearing of two different Tribolium species in the laboratory, Tribolium castaneum and Tribolium confusum, which differs morphologically in the last three antennal segments. Erives also conducted the first ever regulatory genomic comparisons between T. castaneum and the distantly-related Tenebrio molitor, the yellow mealworm beetle. Furthermore, Erives caught, identified and sequenced the genomes of three different wild lowan tenebrionid beetles for comparisons. Erives also developed parts of this work into a new Evolution Lab, which will focus on student sequencing of new wild-caught lowan beetles with interesting antennal adaptations using third-generation sequencing technology.

**FANG, HAO**, associate professor, Mathematics, 14 years of service, Spring 2021  
*Title:* Stability in Conformal Geometry

Professor Fang conducted research during his PDA award time period, which resulted in the following publications in peer reviewed journals: 1. Fang, H., Wei, W.  $\Sigma_2$  Yamabe problem on conic spheres II: boundary compactness of the moduli, to appear in Pacific Journal of Mathematics. 2. Fang, H., Ma, B. Constant Q-curvature metrics on conic 4-manifolds, to appear in Advance in Calculus of Variations. Due to the pandemic travel restrictions, Professor Fang did not carry out his domestic and international travel plan to meet fellow researchers. However, he was able to make online presentations at an international research conference hosted in Shanghai, China and seminar talks at Princeton University. Fang continued to interact with his graduate students through Zoom.

**FASSLER, JAN S**, professor, Biology, 32 years of service, Fall 2020  
*Title:* Integrating Data Science/Analytics, the Skills to Handle "Big Data", Into Our Research and Existing Bioinformatics Curricula at the University of Iowa

Professor Fassler prepared and submitted two new manuscripts pertaining to ongoing research interests of her lab. In addition, she initiated a new research collaboration with colleagues at the

university, the results of which are currently being prepared for publication and will provide preliminary data for grant applications to be submitted next fall. Together with colleagues in the department, funds were obtained to support the Bioinformatic/Big Data curricular goals of Fassler's PDA application, and work towards updating and rebranding the existing Bioinformatics course is underway. Benefits will accrue from the potential for additional funding to be brought to the university based on collaborative research projects and the NIH supplement that they are using to strengthen the STEM education of young adults and to inspire future careers in the burgeoning field of Data Science.

**FU, HAI**, associate professor, Physics & Astronomy, 6 years of service, halftime for academic year 2020-2021

*Title:* Dating Galaxy Mergers with Dynamical Models

Professor Fu published six journal articles, submitted a three-year grant proposal to the National Science Foundation, and wrote two observing proposals to use large telescopes on Mauna Kea, Hawaii. One of the two major articles reported the discovery of the first cold gas pipeline found around a massive starburst galaxy, the other reported the spatial extent of nuclear star formation triggered by tidal forces in galactic interactions. The awarded NSF grant will support graduate and undergraduate research at the Iowa. The observing proposals earned the team 4.5 nights of observation time. High-quality data were obtained from three of the nights when the weather was good on the summit. Following the social distance guidelines of the COVID-19 pandemic, Fu met with Professor Barnes regularly to develop methods for automating the dynamical modeling tool "Identikit". Many improvements to Identikit have been made and the team is preparing a manuscript to report their modeling results of a sample of merging galaxies that have key kinematics measurements from spectroscopic observations.

**GILOTTI, JANE A**, professor, Earth & Environmental Sciences, 20 years of service, halftime for academic year 2020-2021

*Title:* Using Age Proxies to Determine the Size of the Ultrahigh-pressure Terrane in the Greenland Caledonides

Professor Gilotti used her PDA towards the goal of synthesizing results from her three plus decades of geological research in the Arctic. Gilotti contributed information from Greenland and Ellesmere Island to a high-profile paper on strike-slip tectonics of the entire Arctic margin of North America (McClelland et al. 2021), as well as to a larger review paper (McClelland et al. in review). She continued to write up individual data sets for publication, some from former student work (e.g., Caswell et al. in press). The PDA research will support Gilotti's upcoming Fulbright Award as a visiting researcher at AGH University of Science and Technology in Krakow, Poland. These international connections directly benefit University of Iowa students. For example, Gilotti helped two students obtain Fulbright awards for the 2021-2022 academic year and a third made it to the final round. Knowledge of Arctic geology is critical to society's ability to deal with a changing climate. Gilotti's research contributes to this understanding, as does her mentoring of the next generation of polar researchers.

**GOMPPER, DAVID K**, professor, Music, 28 years of service, Fall 2020

*Title:* Piano Concerto

Professor Gompper composed two new music compositions and is in various stages of completing five more, all for a series of performances that are being planned over the next three years. Three of these compositions will be recorded in high-definition video and audio by the English Symphony Orchestra in 2024. His third Naxos CD was published in November 2020. By maintaining an active writing schedule, his teaching methods for both composers and musicians

are enhanced by keeping current and relevant. As a result, the University of Iowa benefits by attracting the best students into the program, demonstrating that music composition is still considered an integral component of the School of Music.

**GREEN, STEVEN H**, professor, Biology, 32 years of service, Fall 2020

*Title:* Neuroimmune Interactions During Neurodegeneration in the Cochlea

Professor Green completed a novel bioinformatics analysis of data obtained from previous gene expression profiling of spiral ganglia (cochlear ganglia) from deafened rats and control normal hearing rats. The outcome was a new insight on the cause of deafness-induced cochlear neurodegeneration, which could improve the efficacy of cochlear implants. Green wrote a chapter for a new book on cell regeneration in the damaged cochlea. Green also wrote a new journal article and revised another article for resubmission to the journal *Scientific Reports*. Green wrote two grant applications, one NIH R01 and a large multi-institutional multi-PI grant (on which Green is the primary principal investigator) for the Department of Defense Hearing Restoration Research Program. These studies are aimed at developing novel pharmaceutical approaches to preventing a major type of noise-induced hearing impairment. Finally, Green worked on development of a new two-semester neurobiology core course that will debut in Fall 2021 and serve needs of undergrads in Neuroscience and other majors and grad students doing neurobiology research in multiple IDGPs and departments.

**GUO, MAN**, associate professor, Social Work, 8 years of service, halftime for academic year 2020-2021

*Title:* Immigration, Aging, and Cognitive Function: A Bi-country Study of Cognitive Function of Older Adults in China and United States

Professor Guo published four papers (three first-authored) and has submitted four additional manuscripts for review (two first-authored). Guo visited University of Hawaii (UH) during the PDA. While at UH, Guo gave two classroom guest lectures and one public talk. The PDA provided Guo with a valuable opportunity to deeply scrutinize and evaluate the contemporary theory and research in areas of immigration, minority aging and social determinants of health. Living in Hawaii during the PDA also allowed Guo to have first-hand observation of multi-cultural assimilation and ethnic dynamics. A deeper understanding of these subjects will transfer to and infuse state-of-the art lectures in Guo's classes, broadening students' horizons and enhancing their cultural competence.

**HEITZMAN, KENDALL**, associate professor, Asian & Slavic Languages & Literature, 7 years of service, Fall 2020

*Title:* The International Style in Japanese Poetry, 1964-present

Professor Heitzman conducted research on a group of Japanese poets who emerged in the 1960s and 1970s, many with an Iowa connection: the most central of these writers were in residence at the University of Iowa as part of the International Writing Program, including Yoshimasu Gōzō (IWP 1970-71), Shiraishi Kazuko (IWP 1973-74), and Yoshihara Sachiko (IWP 1978). Heitzman has been working together with the writers or their surviving families and Japanese scholars and editors to develop a literary history of this generation of Japanese poets and to find rare items published in small print runs and/or relatively inaccessible venues. This project will result in the first book-length study in English of these crucial poets, additions to IWP and UI Libraries websites detailing these writers' connections to Iowa, and additions to a collection of materials to be preserved for posterity by Special Collections in the University of Iowa Main Library. This project is designed to be accessible and of interest to people across the State of Iowa, bringing to light a

moment in history in which Iowa played a key part in global literary culture and in international understanding.

**HOLLINGWORTH, ANDREW R**, professor, Psychological Brain Sciences, 17 years of service, Spring 2021

*Title:* Using Perceptual and Cognitive Science to Understand Errors in Radiological Image Analysis

Professor Hollingworth used the PDA to establish a collaboration with Claudia Mello-Thoms (Iowa Radiology) on the topic: Understanding perceptual errors in Radiology and developing techniques to minimize them. Hollingworth came to this collaboration with expertise in basic vision science. During the PDA, he conducted extensive scholarship in the applied domain of Radiology, applying theories and methods from vision science to this area. He developed two major collaborative research projects: to understand how errors in visual search generate errors in diagnosis, and to characterize the relative prevalence of perceptual and cognitive errors in diagnostic Radiology and to understand their causes. The first research project was funded (NIH R01 award) and is in progress. The second will be submitted for funding (NIH R01 award) in October, 2021. This work will broaden Hollingworth's teaching to include medical diagnosis as a key applied domain in which issues of basic vision science can be grounded. The goal of this research is to reduce error rates in Radiology, and thus it has the potential to benefit society through improved health care.

**HOURCADE, JUAN PABLO**, associate professor, Computer Science, 13 years of service, Fall 2020

*Title:* Write 2nd Edition of Child-Computer Interaction Book

The purpose of the PDA was to write the second edition of Child-Computer Interaction, the most comprehensive book on the topic of designing interactive technologies for children. This is a growing field that has developed a strong and dedicated research community during the past fifteen years. It is also an interdisciplinary field, where computer science, developmental psychology, pedagogy and new media interact. The book currently covers research through 2014 and was in need of an update in order to stay current and relevant. Hourcade used the first edition of the book in a computer science course at UI. The book has also been used at other institutions, such as the University of Washington. Hourcade will make the second edition of the book freely available online, in the same manner the first edition is now available at [childcomputerinteraction.org](http://childcomputerinteraction.org).

**IOVANOV, MIODRAG C**, associate professor, Mathematics, 6 years of service, Fall 2020

*Title:* Interactions Between Algebra and Combinatorics

Professor Iovanov visited several collaborators (J.Jun, A.Sistko, P.Rothmaler) and conducted research in Noncommutative Algebra and Representation Theory. Four projects were finalized and accepted in final form in this period, and two others were submitted (among these, collaborations with J.Jun and A.Sistko). Iovanov has made significant progress on a few other preprints, including a new collaboration with P.Rothmaler. During the visit, he has also presented research in several seminars, met other researchers and started two new collaborations. During many online and some in person meetings with peers from other institutions, teaching ideas and methodologies were discussed openly, and especially ideas to better experiences for students during the pandemic, including on keeping a live online, direct and engaging presence. The PDA recipient is currently putting many of these to work. Furthermore, many research ideas learned during the PDA collaborations will be very useful with current and future PhD students, all contributing to UI's mission to students and society.

**JESKE, DIANE**, professor, Philosophy, 27 years of service, Spring 2021  
*Title:* Friendship and Partiality in Ethics

Professor Jeske undertook two projects: editing The Routledge Handbook of the Philosophy of Friendship, and writing a proposal for and beginning to draft a monograph, The Scope and Limits of Partiality. During the period of the PDA, she read and provided comments on 28 out of the 31 newly solicited chapters of the Handbook. She completed her proposal for the monograph which she submitted to Oxford University Press. That monograph is now under contract with Oxford, and Jeske has completed four out of the proposed eight chapters, with substantial material in place for two more chapters. She also wrote two other commissioned chapters for anthologies, "Sharing Our Lives with Other Species," and "Friendship and Loyalty." These works will deepen Jeske's level of expertise in her areas of specialization, thereby enhancing her teaching of ethics at all levels. The Handbook will be a valuable resource for her own and others' teaching of issues concerning friendship and intimacy more generally. These issues concerning obligation and intimacy are crucial to our deliberations about how to act and what we owe to other persons.

**KE, CHUANREN**, professor, Asian & Slavic Languages & Literature, 26 years of service, Fall 2020

*Title:* Second Language Acquisition of Chinese in Study Abroad Contexts: Proficiency Gains, Program Design and Management, Homestay Experience, and Asian Heritage Learners

Professor Ke submitted two articles during his PDA in fall 2020. Both have been accepted for publication, one in System, a major international journal on applied linguistics, the other in International Chinese Language Education, a major journal on Chinese language learning. Both articles will appear in 2021. Ke has also worked on another manuscript, which is in final stage of completion. Once completed, Ke will submit it to a journal. Ke believes that the practical suggestions and pedagogical implications of his PDA research project will be informative for Chinese language instructors, program designers and language policy makers to help learners of Chinese make the most of their study abroad experiences in China.

**LAVEZZO, KATHRYN M**, professor, English, 20 years of service, Spring 2021

*Title:* Race in Medieval Europe: Making Whiteness Visible

Professor Lavezzo used her PDA to research and outline one chapter of her book. The chapter concerns Jews, and involves new research on Iberia, a site that, along with England, is crucial in the history of medieval antisemitism. Lavezzo also completed and submitted two articles (on J.R.R. Tolkien and Stuart Hall). Lavezzo also delivered three presentations: at a Colloquium organized by the Interdisciplinary Humanities Center at UCSB, a talk organized by the English department at UCSB, and a talk at a panel sponsored by the journal Exemplaria at the International Medieval Congress at Kalamazoo, MI. Two of those papers, along with the articles on Tolkien and Hall, helped move Lavezzo toward formulating a fourth book project, on medieval studies and race, entitled Bad Medievalism. The award benefits students at Iowa, insofar as questions of race have increasingly been of concern to young people; each of the books on which Lavezzo is working concern race and offer an historical context to current debates and have modified her pedagogy.

**LIN, QIHANG**, associate professor, Management Sciences, 6 years of service, Fall 2020

*Title:* Efficient Algorithms for Data-Driven Constrained Optimization in Machine Learning

Machine learning technologies have been used in high-stakes decision-making systems like the lending decision, employment screening, and criminal justice sentencing. A new challenge arising is to avoid the unfairness introduced by the AI systems that lead to discriminatory decisions for

protected classes. With this PDA, Professor Lin was able to fully devote his effort to develop effective techniques that prevent an AI system from disproportionately hurting a minority group of people. His approach is to design a machine learning system based on an optimization model with data-driven fairness constraints using various fairness metrics. The direct outcomes of this award include a working paper under final preparation for submission, a journal paper under review, and a grant proposal submitted to NSF of which Lin is a co-PI. The techniques Lin developed during the period of PDA, if implemented in real-world AI systems, can help schools, corporations and governments make fair decisions, preventing them from legal liability for failure to comply with the anti-discrimination laws.

**LINDERMAN, MARC A**, associate professor, Geographical & Sustainability Sciences, 14 years of service, Spring 2021

*Title:* Plot to Regional Level Scaling of Terrestrial Monitoring Data

Professor Linderman was the Principal Investigator (PI), co-PI, and co-I on three research proposals including funded proposals to enhance satellite sensor development at the university and to examine statewide opportunities and barriers to renewable energy adoption and carbon sequestration. The proposals have the potential to significantly enhance collaboration across the university as well as statewide outreach and national recognition of the university. Finally, Linderman was the PI on a USDA grant proposal to develop regional research sites on soil moisture monitoring and calibration. This includes collaboration across three Midwest universities including Kansas State University and the University of Nebraska-Lincoln. In addition, Linderman mentored graduate student research. The students submitted a manuscript on object based classification of floodplain vegetation using hierarchical embedded objects. Professor Linderman also expanded his research into parallel computing to study global vegetation dynamics. Finally, Linderman significantly expanded his research collaborations. All these opportunities will provide material and techniques for his courses.

**LO, AMBROSE**, associate professor, Statistics & Actuarial Science, 5 years of service, Spring 2021

*Title:* A Predictive Analytic Approach to Optimal Reinsurance Design

The past few decades have seen an unparalleled surge in the frequency and severity of different kinds of catastrophes (such as COVID-19). These catastrophes wrought widespread havoc on the society in general and highlighted a critical need for insurance companies in particular to develop quantitative strategies for more accurate predictions of catastrophic events and more effective risk mitigation. In this project, Professor Lo conducted research on the construction and evaluation of data-driven predictive models based on real, publicly available insurance data, and the use of these predictive models to formulate optimal reinsurance policy recommendations. He has compiled the findings of his research as two case studies, one on generalized linear models and one on decision trees, published in the study guides of actuarial exams used by students worldwide. These case studies are valuable resources illustrating the methodology and applications of predictive analytics to insurance practice and will serve as useful pedagogical aids in Lo's STAT: 4560 Statistics for Risk Modeling course.

**MCCLELLAND, BILL C**, professor, Earth & Environmental Sci, 11 years of service, Spring 2021

*Title:* Developing International Collaboration to Evaluate the Role of Svalbard in the Tectonic Evolution of the Arctic

The original activities proposed for Professor McClelland's PDA involved international travel and thus were significantly impacted by the global COVID-19 pandemic. Deferring the PDA until Spring 2021 and unsuccessfully hoping to travel, McClelland instead took on development of a

virtual field course to meet the COVID-related teaching demands of the Department of Earth & Environmental Sciences, preparation of two manuscripts that involved synthesis of a decade of research on the geologic evolution of the circum-Arctic region, and planning for an extended field season in the Brooks Range, Alaska in July and August, 2021 that involved UI graduate students. Outcomes of the PDA include course material available for future virtual field courses and eight publications (two published, three in press, three in review). Course and research materials will benefit students through indirect involvement with field-based research. McClelland's synthesis of circum-Arctic geology has significant implications and enables better societal planning for strategic resources in the Arctic.

**MCMURRAY, BOB**, professor, Psychological Brain Science, 15 years of service, Spring 2021  
*Title:* The Cognitive Science of Language and Reading Disorders: Toward a Theoretical Synthesis

Travel and other restrictions from the COVID-19 pandemic prevented Professor McMurray from traveling and developing the systematic body of work he was hoping to. Nonetheless he was able to adapt and accomplished a number of key goals. First and most importantly, he has been running a large longitudinal study of children's language and reading and development, and his team managed to recruit and test 250 children this spring and summer. During the PDA period he realized that all of these children were facing school disruption because of the pandemic, but that children in future years would not (since they were not of school age during the pandemic). Thus he submitted two grants proposing to extend his work to future populations of children. In addition, he helped submit another collaborative grant with the University of Missouri to examine language development in a huge dataset of children from the Head Start program. Finally, he was able to develop and submit two new significant papers offering a theoretical synthesis of much of his work (and one was provisionally accepted). He also used the time to work with his students to submit a large backlog of other papers.

**MEURICE, YANNICK**, professor, Physics & Astronomy, 29 years of service, Fall 2020  
*Title:* New Applications of Quantum Computing in High Energy Physics

Professor Meurice develops quantum computing tools for problems in high energy physics. He completed a book "Quantum Field theory: a quantum computation approach" which is now being published by the Institute of Physics. He wrote a long review article for Reviews of Modern Physics on Tensor Field Theory. He worked with physicists using trapped-ion facilities at the University of Maryland to perform quantum computations relevant for the study of high-energy particle collisions. He developed methods to improve quantum computations done with IBMQ machines. He worked on proposals and journals articles. He participated in virtual conferences and workshops and gave oral presentations. He explored new research directions with his post-docs and students. He developed material for a new course on quantum computing that he is now teaching and found ways to give students access to actual quantum computers. The research and teaching contribute to student training and will help their admission to graduate programs, postdoctoral appointments or employment in the emerging quantum computing industries.

**MOORE, MICHAEL E**, associate professor, History, 11 years of service, Spring 2021  
*Title:* The End of the Carolingian Empire: The Cadaver Trial of Pope Formosus

The opportunity of a PDA allowed Professor Moore to advance his career on many levels: by participating in international conferences and collaborating with colleagues in the U.S. and abroad - in Italy, France and the Netherlands; by completing writing assignments for major publications, publishing a book review, and furthering the progress of several other ongoing projects, especially in the field of early medieval European history.

**OGREN, CHRISTINE A**, associate professor, Educational Policy and Leadership, 20 years of service, Fall 2020

*Title:* Completion of Book on the History of U.S. Schoolteachers' "Summers Off"

Professor Ogren made significant progress on her book manuscript on the history of how U.S. schoolteachers have spent the summer and completed two other writing projects. In "Summers Off," Ogren analyzes how teachers' summer activities challenged or confirmed race and gender roles, influenced their social class standing, affected their professional skills and status, and influenced the schools. Her primary accomplishment during the PDA semester was the completion of polished versions of chapter 4 and chapter 1. This project is enhancing four of the graduate seminars she teaches, and "Summers Off" contributes to scholarship on the history of education and discussions of teacher professionalism and salary issues among policymakers and general audiences in Iowa and nationally. During the PDA semester, Ogren also revised an article manuscript and a chapter for an edited book, both of which were then accepted for publication, and made three presentations at the virtual meeting of the History of Education Society.

**PEMMARAJU, SRIRAM V**, professor, Computer Science, 19 years of service, Spring 2021

*Title:* Collaborative Research in Distributed Graph Algorithms and Computational Epidemiology for Healthcare Acquired Infections

Professor Pemmaraju conducted research in two areas: distributed algorithms and computational epidemiology. His research on distributed algorithms resolved a fundamental question on how much communication is needed to solve coordination problems in distributed computing. This led to a publication in July 2021 in a premier conference on distributed computing. Pemmaraju also started a book project on algorithms in a model of large-scale distributed computation (expected completion Dec 2022). His research in computational epidemiology involved several projects within the CDC-funded Modeling Infectious Diseases in Healthcare Network (MInD Healthcare), along with projects on COVID-19 in healthcare facilities. These projects have led to four published papers in top venues, four working papers to be submitted this fall, and one NSF proposal to be submitted at the end of September. Pemmaraju presented these results to the CDC and other institutions in the MInD Healthcare. He anticipates regularly offering a computational epidemiology course, based on his recent research, to seniors and graduate students at Iowa.

**PEROVIC, KATARINA**, associate professor, Philosophy, 8 years of service, Spring 2021

*Title:* A Book Project on Pseudo-Problems of Metaphysics

Professor Perovic applied for the PDA in August of 2019, with the hope of having uninterrupted time to work on her book project titled Pseudo-Problems of Metaphysics. The plan at the time was to write three chapters of the proposed book during the spring semester of 2021. Given the disruption of the pandemic her research plans had to be somewhat adjusted and re-calibrated. She focused on writing articles/book chapters, portions of which will make it into the PseudoProblems of Metaphysics book and into a short book on Ontological Categories that is currently under contract with Cambridge University Press and will be coming out in the fall/winter.

**PHILLIPS, DAMANI C**, associate professor, African-American Studies, 5 years of service, Spring 2021

*Title:* Incorporating Iconic Global Folk Dance Music into Jazz

Professor Phillips completed the project planning, music composing/arranging and recording of his next album release "No More Apologies". This PDA award provided the time away from daily teaching needed to complete a project of this magnitude. The updated approach and intricacies of the work completed during this period has prepared Phillips to offer UI students updated

approaches to jazz composition and arranging that have been thoroughly tested in practical application. Phillips' project effectively challenges the notion of what is/isn't possible in the use of strings on jazz composition, and by virtue of the project's successful completion, demonstrates that even the most unlikely of musical collaborations are possible if all parties involved can find cultural middle ground. The recording's success represents new directions in jazz music that have previously gone unexplored.

**RAGHAVAN, SURESH L**, professor, Biomedical Engineering, 19 years of service, Spring 2021  
*Title:* Biomedical Device Design and Development

The objective of Professor Raghavan's PDA was to work toward development of a novel device that will save lives in the intensive care units and surgical operative rooms at hospitals worldwide. Through the use of novel electrochemical principles he worked to design a catheter that can be used to measure and monitor blood flow in the heart. During the PDA, Raghavan trained himself in a field of study he had previously not worked in (electrochemistry), developed new ideas for medical devices, published a manuscript in this field, and obtained a large external grant from NIH to use electrochemical principles for development of a COVID-relevant medical device.

**RANTANEN, JASON**, professor, Law, 8 years of service, Fall 2020  
*Title:* Understanding Patents

Professor Rantanen used his PDA to develop skills in Python and STATA and to conduct big-data analysis of judicial decisions by the United States Court of Appeals for the Federal Circuit. His research resulted in the development of two articles, one of which was published in December 2020, and major enhancements to the largest public dataset of decisions by the Federal Circuit. By developing skills at big-data analysis of legal texts, Rantanen's work will benefit both colleagues within the College of Law and legal researchers more generally. In addition, Rantanen engaged in a major revision of the Introduction to Intellectual Property course. While Professor Rantanen was unable to travel due to COVID-19, he formed new connections as an Obermann Fellow. He will present his research at conferences during Spring 2021.

**REITZ, JOHN C**, Professor, Law, 36 years of service, Spring 2021  
*Title:* Comparative Law and the Political Economy of Legal Systems

Professor Reitz conducted research and writing for a project on the ways that a legal system reflects the degree to which the government in that country intervenes and is expected to intervene in the economy (what he calls a country's form of "political economy"), and he made several invited presentations on that subject. But the main focus of his efforts was on a paper begun before the PDA on the reasons for courts to defer to administrative decisions and regulations under U.S. federal law. As he struggled with difficulties in the argument, Reitz changed and deepened the focus of the paper. What had started out as an argument that there are only two justifications for deference, congressional delegation or the administration's expertise, became an argument that understanding the logic of deference based on delegation and expertise makes the law of deference less confusing and resolves several controversies about deference. The paper's insights are already incorporated into his teaching and administrative law course. Reitz needs to complete the draft soon because the issue will soon come to the Supreme Court.

**RENO, MARY HALL**, professor, Physics & Astronomy, 29 years of service, Fall 2020  
*Title:* Particle Astrophysics: Neutrino Signals from High Energy Astrophysical Processes

Professor Reno completed research on neutrino physics and astrophysics, described in four presentations at international conferences or workshops during the PDA. Her research in neutrino

astrophysics appears in two new journal articles, both under review, and in two published journal articles. She submitted two proposals to NASA for funding, currently under review. Software developed in this PDA to benefit data analysis and detector development for space-based neutrino detectors has been released to collaborators for testing and soon will be released to the public. This software project forms a significant part of Reno's graduate student's PhD research. Reno progressed in her research on neutrino production at the Large Hadron Collider where a new Forward Physics Facility to measure neutrinos and other particles is planned. With a postdoctoral researcher, she began a new theoretical calculation relevant to the Deep Underground Neutrino Experiment. Elements of Reno's research will be incorporated in her course on Nuclear and Particle Physics and in her work with graduate students.

**SANDER, HEATHER A**, associate professor, Geographical & Sustainability Sciences, 8 years of service, Fall 2020

*Title:* Improve and Expand Urban Ecosystem Monitoring and Outreach in Eastern Iowa

Urbanization typically reduces biodiversity, often with adverse effects on human well-being. Understanding how cities support biodiversity and how biodiversity, in turn, supports human welfare is key to managing sustainable, healthy cities. Professor Sander used her PDA to expand her research regarding the relationships between urban species, environments and human well-being and ways that these relationships could inform urban planning and management. As a result of this PDA, Sander submitted six articles to high-quality journals and has six articles in preparation, three that will be submitted for peer review in February 2021 and three that will be submitted for peer review during the summer of 2021. Sander also drafted and submitted two grant proposals to fund her research and her outreach in Iowa schools. Both undergraduate and graduate students benefited from this work as participants and authors and will benefit in the future when Sander uses her data and results in her classes.

**SEVERINO, CAROL**, professor, CLAS-Rhetoric, 29 years of service, Spring 2021

*Title:* Tutor Scaffolding and Second Language Writing Development (SLW) in English as a Second Language and Foreign Language (FL) Settings

Professor Severino pursued her research agenda on writing development, focusing on second language writing development in English and Spanish. She revised three co-authored articles for publication, two on ESL writing and one on Spanish-as-a-second-language writing. She wrote a new article based on recent writing-to-learn-language research as applied to her experience taking a Spanish Journalism course. In conjunction with the UI Writing and Communication emphasis, she planned a new article on the history of academic writing pedagogy at Iowa which will incorporate the Writing Center's recent UI faculty survey results. She coordinated the Winter Institute on Teaching with Writing, keynoted the Midwest Writing Centers Association Conference, and served as a US State Department English language specialist for Brazil. This work will benefit her teaching of writing center tutors, writing center students and writing fellows, as well as graduate students studying second language writing research and pedagogy. Her work on Writing across the Curriculum will benefit UI faculty and student development.

**TIVANSKI, ALEXEI V**, associate professor, Chemistry, 12 years of service, Spring 2021

*Title:* New Directions in Materials Science Research

Professor Tivanski used this PDA to develop a new collaborative research direction in materials chemistry to include an emerging class of flexible porous materials. A particular emphasis was the development of novel microscopy-based methods to study effects of crystal downsizing to the nanoscale level on the mechanical properties of highly porous and flexible metal organic

frameworks. Metal organic frameworks are a class of functional porous materials that exhibit tunable physical and chemical properties. The results are expected to aid in the development of fundamental understanding of how crystal downsizing of metal organic frameworks influences their mechanical and gas adsorption properties, that in turn will potentially enable the integration of such crystalline solids towards device applications (e.g., chemical sensors, energy storage) in Iowa and elsewhere. The work will also be incorporated into his nanoscience and surface chemistry courses as well as his research teaching with undergraduate and graduate students in chemistry who work with nanodimensional crystalline materials.

**WATT, SHERRY K**, professor, Educational Policy and Leadership, 19 years of service, Spring 2021

*Title:* Synthesizing and Disseminating Evidence for the Theory of Being

Professor Watt synthesized 20 years of her research on ways of being in controversial dialogue across social difference into a book-length manuscript for her PDA. The synthesized content from over 100 publications will be published in May 2021 in the book entitled, *The Theory of Being: Practices for Transforming Self and Communities across Difference*. In her 2014 book, *Designing Transformative Multicultural Initiatives*, she introduces the Authentic, Action-Oriented Framing for Environmental Shifts (AAFES) framework and expounds upon the Privileged Identity Exploration (PIE) model. Both together identify the individual skills and environmental conditions for having productive dialogue across difference. Publications, presentations, and research collaborations on AAFES and PIE gave rise to a unifying framework, the Theory of Being (TOB). The TOB strengthens 'how' (processes) to engage in difficult dialogues rather than solely on 'what' (outcomes) to address the problem. The conclusions from this data inform her teaching, moves forward her research agenda and edifies her practical work at the University of Iowa and with the local school systems, businesses and non-profit industries.

**WHALEY, DEBORAH E**, professor, American Studies, 12 years of service, Fall 2020

*Title:* Feeling Her Fragmented Mind: Women, Race, and Dissociative Identities in Popular Science, Literature, and Culture

Professor Whaley used this PDA to complete the research for and draft final chapters of *Feeling Her Fragmented Mind: Women, Race, and Dissociative Identities in Popular Literature, Culture, and Science*. *Feeling Her Fragmented Mind* engages with the intersection of diversity and disability studies to explore the trope of dissociative identity disorder (DID) and disparities in the medical industrial complex. Whaley wrote an exhibition proposal based on this monograph for a museum, drafted a course on the topic, published an essay on Black comics and music, conducted a workshop on teaching during COVID-19, did a guest speaker talk, participated as a panelist on three conference panels, conducted a talk-back session on the film *Coded Bias* for the art film house FilmScene, did training for UI search committees, and finished editing the page proofs for her co-edited book *Keywords in Comics Studies*. At a time when Iowa City's Black, Latinx and Asian/Asian American population is growing, it is essential that scholarship, programming and courses in the area of comparative American literature and culture receive implementation and recognition.

**YE, YANGBO**, professor, Mathematics, 29 years of service, Spring 2021

*Title:* Number Theory and Its Applications in Internet Security

This PDA had two objectives: seek scientific evidence on computational complexity of integer factorization, and prove bounds for automorphic L-functions and their power moments. Professor Ye collaborated with professors from San Diego State University, St. Ambrose University and

Shandong University - Weihai, and his three doctoral students. They built databases, trained algorithms, and obtained important preliminary results for the first objective. They had four research papers published or submitted for publication for the second objective. The three graduate students participated in the second objective as their thesis research and had completed preliminary drafts of their doctoral dissertations. Ye also gave two international invited talks on their research progress. Through this PDA he addressed a potential security problem for internet communication and digital financial transaction. The outcome from this PDA provided a step toward solving this problem. In addition, Professor Ye's three Ph.D. students benefited directly from this award by active participation.

**YOUNG, RACHEL**, associate professor, Journalism & Mass Communications, 6 years of service, Spring 2021

*Title:* Representing Stigma: Advocates, Journalists, and the Opioid Crisis

Professor Young used her PDA to research media and health stigma and to develop partnerships with community organizations focused on public health. She initiated or continued three main research projects on media and health stigma: an experiment on the counterintuitive effects of the messages produced by health departments to combat addiction stigma, a collaborative digital storytelling project with a local harm reduction organization, and a survey of health journalists. In addition, she had two first-authored manuscripts published and two requests for revision of other first-authored manuscripts. She also gave an invited presentation on her stigma and storytelling work at Pennsylvania State University. This PDA award will benefit University of Iowa students because it allowed Young to develop new course materials on health and stigma, an issue students care about deeply. The award benefits the state of Iowa or society generally because her research projects involve community partners or relate to issues of great public concern.

**ZHANG, XIAOYI**, associate professor, Mathematics, 10 years of service, Spring 2021

*Title:* Critical Nonlinear Schroedinger Equations and Integrable Systems

Professor Zhang used her PDA to do research on the study of solutions for nonlinear Schroedinger equation, which is a very important model arising from quantum mechanism and is widely used in water wave, geometric optics etc. Her work centers on understanding the behavior of solutions when the equation contains an external potential. While problems with external potential are already extensively studied, few of the studies addressed the case when the potential has the critical singularity. Her results developed new techniques and brought new insight on the impact of the singular potential to the related community. The sponsored research has already resulted in an article under review with highly positive referee report. She also has two more articles in progress. This series of research has attracted attention from the research community, as shown by several invited conference and seminar talks (online). Zhang also used her PDA to finish most of her lecture notes for the graduate course MATH 6700: Partial differential Equations. She will incorporate her research into courses as well as directing possible graduate students.

### **Iowa State University**

**BHATTACHARYA, SOURABH**, Associate Professor, Mechanical Engineering, 9 years of service, 2020-2021 academic year

*Title:* From Multi-agent Learning to Mechanism Design for Autonomous Systems

Professor Bhattacharya used the assignment to apply his expertise in game-theoretic analysis to devise strategies to defend networks against cybersecurity attacks. Outcomes of the PDA included five publications and conference presentations; four submitted publications and conference presentations; the successful graduation of master's and Ph.D. students; and the preparation of two National Science Foundation funding proposals.

**CHAPELLE, CAROL ANN**, Distinguished Professor, English, 36 years of service, 2020-2021 academic year

*Title:* Technology and Second Language Learning

Professor Chapelle had been chosen to receive a \$50,000 Fulbright award to serve as Distinguished Research Chair at Carleton University in Ottawa, Canada, but was unable to visit due to the COVID-19 pandemic. Despite the setback, Chapelle made substantial progress on a second edition book manuscript on technology mediated second language learning, to be published by Cambridge University Press, and will be used by students and researchers who investigate language learning. Chapelle was also on a team receiving an \$84,000 grant to develop online academic writing courses.

**COFFELT, TINA A**, Associate Professor, English, 9 years of service, 2020-2021 academic year

*Title:* Sexual Communication Books: Interpersonal Sexual Communication Across the Lifespan

Professor Coffelt used the assignment to complete her book on this subject, which will be released in late 2021 or early 2022. The book explores interpersonal sexual communication processes as individuals develop from children to older adults. Coffelt also completed a grant project on enhancing the reputation of research in Uzbekistan, which included an online professional development program on academic writing and publishing; and delivered a conference presentation.

**EVANS, JAMES WILLIAM**, Professor, Physics and Astronomy and Mathematics, 30 years of service, spring 2021

*Title:* Predictive Multiscale Modeling of Physical Phenomena from Nano- and Meso-Scales

Professor Evans traveled to Louisiana State University and UCLA during his assignment, where he worked with colleagues to expand his research on surface science applications. This work will also aid in the development of interdisciplinary modeling courses at Iowa State. Evans also worked on numerous external funding proposals, delivered two invited presentations, and advised undergraduate and graduate students in the Department of Physics and Astronomy.

**GANSEMER-TOPF, ANN MARIE**, Associate Professor, School of Education, 9 years of service, spring 2021

*Title:* Investigating Effective Strategies for Translating Research into Policy

Due to the pandemic, Professor Gansemer-Topf modified her assignment to focus on writing, presenting and research activities. These efforts resulted in the submission of nine manuscripts, six of which have been accepted; six conference and invited presentations; service to graduate students; and submission of a \$300,000 external funding application to the National Science Foundation.

**JIA, YAN-BIN**, Professor, Computer Science, 22 years of service, spring 2021

*Title:* Control of a Robotic Arm to Use Hand Tools

Professor Jia worked with a Ph.D. student on enabling robots to manipulate hand tools (such as a screwdriver or wrench), and submitted a \$625,000 National Science Foundation funding proposal on dexterous robotic cutting. Jia also submitted two journal articles; delivered one conference paper and two invited presentations; and served as associate editor of an IEEE robotics journal.

**KONG, SONG-CHARNG**, Professor, Mechanical Engineering, 16 years of service, fall 2020  
*Title: Advancing Computational Capabilities to Predict Biofuel Spray Dynamics*

Professor Kong's work on spray dynamics in biofuels resulted in submission of a journal article, expanded research to support Iowa's biofuel industry, and external funding proposals in the area of diesel engine combustion using 100% ethanol.

**KOTHARI, SURAJ C**, Professor, Electrical and Computer Engineering, 37 years of service, fall 2020  
*Title: A Study of Systems of Massive Connections with Implications for Cybersecurity*

Professor Kothari use the assignment to write a portions of a book based on technology he has developed for creating, story, querying, analyzing and visualizing mathematical models of software, which was funded by the Defense Advanced Research Projects Agency (DARPA). Kothari conducted research on massive connections, and the application of algebra to cybersecurity. Other outcomes included two papers, revision of an ISU course on software analysis and verification, and a \$3 million external funding application.

**LEE, SOJUNG**, Associate Professor, Apparel, Events, and Hospitality Management, 7 years of service, spring 2021  
*Title: The Impact of Volunteers on Sustainable Rural Community Development: A Case of Rural Festivals in South Korea*

Professor Lee's assignment was modified to focus on club research, an e-book on tourism, and completion and submission of seven research articles. These efforts resulted in \$21,000 in external funding from the National Club Association Foundation; and substantial progress on the e-book, which will be published in 2022 and used in Iowa State's global tourism courses.

**LESLIE, THOMAS**, Morrill Professor, Architecture, 21 years of service, spring 2021  
*Title: Chicago Skyscrapers: 1934-1984*

Professor Leslie completed a 140,000-word manuscript demonstrating how Chicago's 20<sup>th</sup> century skyscrapers are evidence of post-WWII technological, socioeconomic, political and demographic changes, as well as how they reflect negotiations between economic and aesthetic desires, and material and social realities. The book is a sequel to Leslie's 2013 book on pre-depression era skyscrapers. Other outcomes included numerous virtual lectures and the development of course material related to design, history and technology.

**LEVIS, JOHN M**, Professor, English, 21 years of service, fall 2020  
*Title: Innovative, Research-Informed English Pronunciation Instruction: Digital Pronunciation Teaching and Teacher Education for Suprasegmentals*

Professor Levis used the assignment to develop the first 12 chapters of an integrated digital student textbook/teacher's guide for teaching pronunciation to nonnative speakers of English; and to develop a framework for innovative computer-assisted language learning materials for

pronunciation teaching. Levis also submitted and/or published six journal articles, seven book chapters, two conference papers, five reviews, and a co-edited book that will be published in 2022.

**NAGLE, CHARLES LEO V**, Assistant Professor, World Languages and Cultures, 6 years of service, fall 2020

*Title:* Identifying the Motivational Factors that Predict Language Learning Effort and Achievement

Professor Nagle used the assignment to building a quantitative model of the motivational factors that influence achievement-related choices and behaviors in second language learning. This work resulted in one publication in press (and two others in development), as well as six additional peer-reviewed publications, a Fulbright research and teaching award, and a \$250,000 National Science Foundation funding award.

**PRELL, SOEREN**, Professor, Physics and Astronomy, 19 years of service, fall 2020

*Title:* Search for Evidence of New Physics in B Decays with the Belle II Experiment

Professor Prell represented Iowa State and its contributions to Belle II, one of two experiments in the world dedicated to the research of heavy quarks and charge-parity violation over the next decade. Prell received \$38,000 in U.S. Department of Energy funding to support travel to Japan; the work will also support the ISU Belle II research group's next three-year DOE grant application.

**ROSA, JOSE ANTONIO**, Professor, Marketing, 6 years of service, fall 2020

*Title:* Startup Impact Readiness Program – Education and Performance Assessment

Professor Rosa worked with colleagues over his assignment to advance his knowledge and contributions in the areas of managerial decision making, product/service development, industry clusters and conflict resolution. These efforts resulted in the submission of two journal manuscripts and an upcoming book chapter on "Industry Competitiveness and Sustainable Peace: In Pursuit of a Sound Business Strategy."

**SHENK, LINDA**, Associate Professor, English, 16 years of service, spring 2021

*Title:* Minding the Gaps, S(t)imulating New Climate Futures: Where the Literary Humanities Geosciences, and Community Voices Converge

Professor Shenk studied scientists' ability to convey future climate conditions to the broader public during her proposed assignment. Shenk also submitted two journal articles, contributed to four external grant proposals, published a computer simulation model on "community environment" for public use, delivered two invited workshops, and developed a K-12 curriculum module with ISU Extension and Outreach that is currently in use in Winneshiek County.

**SHIRTCLIFF, BENJAMIN A**, Assistant Professor, Landscape Architecture, 7 years of service, fall 2020

*Title:* City Leisure and Play: Advancing Applied Research and Scholarship into Adolescent, Inclusive Design

Professor Shirtcliff made substantial progress on a book project on youth-inclusive urban design practices, as well as applied his research at multiple scales, from small, Midwestern towns to large cities. Outcomes include six publications, presentations and invited talks; a \$63,000 National

Institutes of Health funding award to pursue training, research and publications on adolescent health disparities and built environments; and a \$25,000 Mayor's Institute on City Design award.

**SONG, GUANG**, Associate Professor, Computer Science, 15 years of service, spring 2021  
*Title:* Efficient and Accurate Computational Protein Dynamics Studies of Very Large Structure Complexes

Professor Song focused the assignment on computational studies of protein dynamics, resulting in two journal publications. Song also received advanced training in artificial intelligence, machine learning and convolutional neural network and graph learning, and applied them to their research program.

**SQUIRE, MITCHELL**, Professor, Architecture, 24 years of service, fall 2020  
*Title:* Self-Portraits on the Socio-Sexual Effects of Extractive Economies and the Material Geophysics of Race

Professor Squire's assignment was focused on a series of self-portraits and performances that explore the socio-sexual effects of extractive economies. Outcomes included 28 portraits, planning for exhibitions at the Des Moines Art Center and Webster University in St. Louis, teaching innovations, and five public lectures. Squire also served as a distinguished visiting professor at the City University of New York during his assignment.

**STEGEMOLLER, ELIZABETH**, Associate Professor, Kinesiology, 8 years of service, fall 2020  
*Title:* Project 1: Improving and Expanding Access to Singing Groups for Parkinson's Disease; and Project 2: Improving the Quality and Deliver of the Online Course, Neuroscience and Music

Professor Stegemoller prepared two publications during her assignment. She also worked with her graduate students to complete 10 papers under review, as well as lab projects and dissertations, and adjusted her research to a virtual environment. These efforts resulted in \$1.7M in external funding applications, one of which has already been funded by the National Endowment for the arts for \$90,000.

**TIAN, JIN**, Associate Professor, Computer Science, 19 years of service, 2020-2021 academic year  
*Title:* Causal Machine Learning and Decision-Making

Professor Tian spent his assignment at Columbia University, working with colleagues to develop a machine learning theory for decision-making that is both predictive and explanatory. This work resulted in three published papers in artificial intelligence and machine learning, four submitted manuscripts under review, and a \$290,000 external funding proposal.

**WEI, MEIFEN**, Professor, Psychology, 19 years of service, 2020-2021 academic year  
*Title:* Considering the Role of Culture to Understand the Emotion Regulation Process

Professor Wei used the FPDA to expand her research on Asian American culture and emotion regulation, with colleagues at the University of Maryland and National Taiwan Normal University. This work resulted in 12 submitted publications (seven in press and five under review), several co-authored by ISU graduate students, and \$100,000 in external funding from Taiwan Ministry of Science and Technology.

**YOUNGS, CURTIS R**, Professor, Animal Science, 32 years of service, spring 2021  
*Title: Livestock Embryo Transfer: Science and Application*

Professor Youngs drafted a textbook on the proper use of embryo transfer for the production of safe and nutritious animal-sourced foods during his proposed assignment. The text will be used not only for Iowa State undergraduate courses in animal science, but also as a much-needed update for scientists, teachers and students across the globe.

**ZHANG, ZHU**, Associate Professor, Information Systems and Business Analytics, 7 years of service, fall 2020  
*Title: Advancing Frontier of Business AI Research*

Professor Zhang used his assignment to conduct collaborative research in business-oriented artificial intelligence with Microsoft Research. The results of this work include three manuscripts, a conference presentation, and two collaborative research projects still in process with Microsoft. Zhang also received highly valued computational resources from Microsoft that will be used for high performance computing in the Ivy College of Business.