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Biochemists Teaching a Sophomore Cell Biology and Molecular Biology

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Introduction

Several surprisingly different laboratory centrifuge designs have already been developed through other projects. The hand-driven designs made of paper represent one end of the simplicity spectrum. The model demonstrated that high-speed centrifuges can be powered by rotary tools. The lack of lids on these instruments' spin tubes can increase the likelihood of contamination in the laboratory. Centrifuge projects control themselves with particular motors and drivers, which may be more difficult to obtain. makes use of laser-cut panels because 3D printed parts are now much less expensive. The open-source centrifuge published is probably the most similar to the device described in this manuscript. But it can only spin two tubes at once. A container box containing the fan must be opened and closed with both hands. Additionally, the authors decided to remove the fan's blades, which can cause an imbalance. It has the advantages of not needing soldering and can spin at high RPM, but it can only spin two tubes and does not have a safety lid switch. PCR strip tubes cannot be spun by any of the above centrifuges.

Many biochemists and molecular cell biologists found that their initial interest in biology was sparked by firsthand experience. The majority of young children observes the sprouting of seeds, plant a small garden, or conduct the experiment with colored water on celery; Some might help deliver a calf or a litter of puppies or make a pH indicator out of purple cabbage. As a result of these experiences, I frequently required a trip to the neighborhood library or the removal of a dusty college book from the living room shelf in order to answer questions about natural phenomena, most of which concerned biology. Interests grew by middle school, and it was amazing to learn about and draw atomic orbitals. With one exception, the subsequent high school foundations in math, chemistry, physics, and biology were routine and lacked the excitement of previous teachers. As a senior taking AP Biology or AP Chemistry, I was immersed in hands-on activities that included everything from animal dissections and enzyme assays to pH curves and active discussions of how and why by teams of students. This laid the groundwork for my choices and college programs because it helped me identify my interests [1].

Description

In the middle of the 1970s, I was an undergraduate student when I first realized that education in biochemistry and cell and molecular biology relied heavily on fundamental research. Along with more established journals like the Journal of Biological Chemistry, the Journal of Cell Biology, and Biochemistry, which were founded in 1974, the journal Cell served as a bridge between cutting-edge research and teaching a sophomore-level cell biology course and eventually biochemistry and biophysical chemistry. Although difficult, the use of primary literature provided current information that was being incorporated into foundational concepts. As a result, after my sophomore year, I had to join a research lab. At first, it was scary, but over time, I developed an independent research project that, along with a rigorous biology and chemistry course, laid the groundwork for more advanced studies.

While studying for a master's degree in cell and molecular biology, graduate students had the chance to apply a number of the same tactics based on primary literature, teach laboratory cell and molecular biology, and gain an understanding of the significance of working in an It became immediately clear that not everyone shares a passion for cutting-edge science. As a result, it was crucial to devise methods for demonstrating how a laboratory application of a research article could be approached. It became crucial to inquire: How can a sophomore be taught to read primary research papers? What is the source of the data and how can it be interpreted? When it comes to answering a specific question, how can a group perform better than an individual? And how does that data result in brand-new information that advances the field? During this two-year period, a fundamental understanding of how to balance the need to comprehend a concept with the need to combine that understanding with cutting-edge research to advance the concept was gained [2].

Working with undergraduate students who had a strong interest in biochemistry and molecular biology was one of the highlights of being a postdoctoral research fellow in the early 1980s. The connections between Escherichia coli fatty acid activation and oxidation and the mechanistic basis of fatty acid transport were the focus of my study. It was during this period that the genuine significance of cooperation in science at the seat became clear and that college understudies were viable individuals from a group given the legitimate coaching. The cloning of the gene for fatty acid transport (fadL), the definition of complementation and expression patterns, and finally the purification of the protein FadL and the demonstration that it is found in the outer membrane were all carried out with the undergraduate students' participation. Undergraduate authors contributed to three of the five postdoc-published papers.

The majority of scientists have similar experiences, so these foundations are not unique. They did, however, inspire my desire to link education and research because they were convinced that education in biochemistry and molecular biology is influenced by basic research. The importance of asking questions, designing and carrying out experiments, collecting data, drawing conclusions, participating in scientific discourse, developing novel pedagogical tools, and communicating findings to advance the field coincides with these links. According to research on science education, this experiential learning also requires the creation of rubrics to establish goals and outcomes and evaluate learning [3].

Setting the stage for cutting-edge research and education in biochemistry and molecular biology which established land grant universities like the University of Nebraska–Lincoln (UNL), was significant because it encouraged “the liberal and practical education of the industrial classes in the various pursuits and professions in life without excluding other scientific and classical studies. In accordance with the belief that higher education is the primary engine for socioeconomic development, UNL's biochemistry program recognizes the significance of broader practical instruction and the training of graduates who are scientifically literate. The recommendations from the American Association for the Advancement of Science, the National Science Foundation, and the National Education Council, which can be found in seminal documents such as Vision and Change. Getting Ahead of the Storm: Creating Jobs and Energizing America for a Better Economic Future This transformation was also influenced by the university's pioneering faculty, particularly the botanist Charles Bessey. Bessey was well-known for his innovative teaching methods, which were based on his belief that research should guide education. His teaching and research were hands-on, and one of his projects was to develop the now-common classification system for flowering plants. The first artificial forest that was created as a result of his tree-planting experiments with his students and the establishment of federal programs that funded modern agricultural experiment stations is the Nebraska

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National Forest, where his efforts continue to have an impact.

The Department of Biochemistry's efforts to fully integrate the undergraduate, graduate, and research missions began with the creation of guiding principles based on the understanding that our research and teaching aims to improve the human condition. Make a commitment to the unwavering pursuit of excellence. Excellence in undergraduate and graduate education, cutting-edge research, and the generation of world-class knowledge all reflect a firm commitment to excellence in teaching and research. Encourage creative work and research that encourages discovery, pushes boundaries, and advances society. Extramural funding and publications in the highest-quality journals in biochemistry and the molecular life sciences must maintain the highest standards for advancing research. Make the foundation for teaching and learning research and creative work. With funding from individual grants and institutional programs that support such research efforts, students pursuing degrees in biochemistry and molecular biology must have every opportunity to conduct high-impact research in faculty laboratories [4].

Learner-centered education prepares students for life. In order for students to become independent in their pursuit of the knowledge and skills necessary to become successful professionals in biochemistry, molecular biology, biomedicine, and related fields, they must be guided and challenged in classrooms and laboratories. Draw in with scholastic, business, and municipal networks all through the state and the world. Connections and joint efforts in natural chemistry stretch out past the walls of the college to schools and colleges inside the state and all over the planet, and through commitment with the confidential area bringing the results of exploration and educating to purchasers as an advantage to society is fundamental Create an academic setting that respects people and ideas from different backgrounds. Diversity and inclusive excellence are fundamental core values that are embraced by UNL faculty and staff in the Department of Biochemistry.

Creating an academic environment in which teaching informs research and research informs teaching The Department of Biochemistry at the University of Nebraska-Lincoln was officially established in its current structure in 1995. The major quickly became well known, particularly for understudies needing to seek after clinical school. Although the department was a small, research-intensive unit, it had established a number of high-impact researches. I joined the division as Seat in 2008 with a profoundly useful and remotely upheld research program, proceeding with our endeavors to grasp the unthinking premise of unsaturated fat vehicle. Our work had advanced from a bacterial model and north. The fact that leading biochemistry was available at UNL was attractive. The challenge was to bring the department into the 21st century by proactively connecting research and teaching through engagement and recruiting new faculty. High-caliber graduate students were conducting cutting-edge research in the department's robust graduate program at the time [5].

Conclusion

At the time, three members of the faculty of biochemistry were working in the biochemistry education research space; however, their efforts were not integrated with those of the faculty, which is typically focused on research. This situation was not unique to UNL; similar difficulties exist nationwide in the STEM fields, many of which have led to two-tiered departments. Moving faculty from being the "talking head" in course delivery to active learning, where teaching and learning are fully integrated with research, required a significant uphill battle. As an undergraduate student, I had witnessed this in action, so I understood the significance of this connection and how teaching was influenced by basic research. In addition, I taught in both medical and graduate education for 22 years prior to taking over as UNL's biochemistry dean. During that time, I made it a point to incorporate fundamental research into the classroom, including medical biochemistry. At UNL, a number of issues started to come together, like the chance to hire a lot of faculty and build a modern, high-impact Department of Biochemistry with strong research programs that are connected to teaching and learning and meet the needs of career paths in the 21st century. In order to advance the goals of the biochemistry research and teaching programs, this included hiring 19 new faculty members two of them jointly. Establishing a faculty with demographics that were shared by the student population and making both strategic and deliberate hires to strengthen research and teaching were the challenges. The concept of inclusive excellence was at the heart of every one of these efforts.

Acknowledgement

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Conflict of Interest

None.

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