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Commentary

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Creation of an American Association of Chemistry Teachers

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ABSTRACT: This commentary briefly describes the creation and organizational structure of a new American Association of Chemistry Teachers, as well as the member benefits.

KEYWORDS: *General Public, Elementary/Middle School Science, High School/Introductory Chemistry*

INTRODUCTION

For many years, both American Chemical Society (ACS) staff and elected leaders of the Society have recognized that high-quality instruction in the sciences at the K−12 level is a crucial element in the preparation of students for careers in chemistry and related STEM disciplines (science, technology, engineering, and mathematics). Good news about the state of K−12 instruction in chemistry can easily be found. The National Science Foundation (NSF), for example, has noted an increase of 10% in the number of students enrolled in high school chemistry courses in the past decade.[1] There has also been an ever-increasing number of K−12 teachers who have been implementing inquiry-based approaches in teaching chemistry.[2] And, as noted elsewhere,[3] there have been significant developments that will shape the future of K−12 chemistry courses as a result of the NRC report *A Framework for K−12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*,[4] which provided the basis upon which a set of Next Generation Science Standards have been developed.[5]

But, problems associated with K−12 chemistry can also be found. First, and perhaps foremost, only 35% of high school chemistry teachers have both a bachelor's degree and certification to teach chemistry.[6] Chemistry has also been identified as a discipline in which there is a significant staffing shortage.[7] Whereas chemists have historically focused their thinking about K−12 education on the high school course, recent reports have suggested that preparing primary and middle school teachers is critical to solving the shortage of STEM professionals in the United States.[8] Others have argued that there are simply not enough qualified STEM teachers to meet student needs.[9] The ACS has responded by becoming a member of the recent presidential initiative "100Kin10" to recruit 100 000 highly qualified STEM teachers over the next 10 years[10] as a step toward the goal of one million additional STEM graduates over the next decade.[11]

Discussions of the state of K−12 instruction in chemistry often fail to take into account the results of research on the unique problems teachers face in their first few years on the job,[12] or the work on factors that contribute to exemplary practice in teaching.[13] This work has shown that it is not enough to simply recruit individuals who have the potential to become exemplary teachers into high-quality teacher preparation programs. In the absence of an active mechanism for supporting beginning teachers, all too many who could become exemplary teachers leave teaching within the first few years.

THE AMERICAN ASSOCIATION OF CHEMISTRY TEACHERS

The author is pleased to be able to announce the result of an action taken by the ACS Board of Directors to provide the necessary funding to create an American Association of Chemistry Teachers (AACT) that will focus on supporting an underserved, yet critically important, sector of the global scientific community: K−12 teachers of chemistry.

What can the ACS provide? The Society can provide the infrastructure upon which the new organization can be built. It can also provide a rich tradition of excellence and a commitment to education that can be traced back to the defining documents and charter of the ACS adopted more than 125 years ago.

What can the AACT become? The AACT will be an organization for teachers and by teachers that can and will provide K−12 chemistry teachers with more of what teachers want rather than what the ACS might think they want. The AACT represents a new direction for the Society, in which ACS no longer does things "to" or "for" teachers, but "with" teachers. The AACT will provide the basis for a true dialogue between K−12 chemistry teachers and subject-matter experts the ACS can provide.

The AACT provides the opportunity to inspire teachers who then inspire students to pursue STEM careers, as well as producing a scientifically literate community of citizens and consumers who are able to make decisions based on sound scientific understanding. It can also provide the opportunity for teachers to share the vitally important pedagogical content knowledge (PCK)—the "tools" or "tricks of the trade"[14−16]—teachers develop on the basis of their experience to help students understand the content knowledge that defines the broad spectrum of activities in the chemical enterprise.

As a metaphor for the sharing of PCK, let us consider the problems beginning chemistry teachers face through the perspective provided by one of the students who came through the chemical education graduate program at Purdue. While reflecting on her experiences as a high school chemistry teacher, she noted that her roommate as an undergraduate had been a preservice elementary education major, and that the two of them shared an apartment after they graduated and took their first teaching positions. Our chemed graduate student noted

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that there was a fundamental difference between the experiences these two teachers encountered in the first few years in the classroom. When a problem came up in her roommate's elementary school classroom, she was able to reach into "a bag of tricks" she had developed during her preservice teaching program. Our chemed graduate student noted that she had a great deal of content knowledge as a result of the preservice teacher education program from which she graduated, but that her own "bag of tricks" for solving the routine problems that arose as a beginning teacher was virtually empty.

AACT MEMBER BENEFITS

One of the primary goals of the new organization is to create an inclusive K−12 chemistry education community. One of the most important benefits of participating in the new American Association of Chemistry Teachers will therefore be the opportunity for networking with other K−12 chemistry teachers. We believe the AACT will help retain the best teachers of chemistry and enable them to help new teachers overcome the challenges they encounter. In essence, the AACT should help teachers of chemistry combat the feeling of isolation that results from being the only chemistry (or science) teacher in their school, or just one of a small group of chemistry or science teachers.

Proposed member benefits for the AACT include an online periodical that will contain articles written by teachers for teachers, as well as a subscription to the ACS publication *ChemMatters*. Other online resources will include multimedia presentations (animations, videos, simulations) that help teach chemistry concepts, as well as a platform for sharing lesson plans, and a blog about chemistry education written by selected AACT members. Online resources will also include a network of members; questions and answers on chemistry pedagogy, classroom techniques, and content questions; message boards for posting ideas for teaching, chemistry in the news, and so on.

As an organization devoted to the development of exemplary teachers of chemistry, the AACT will also take an active role in the professional development of K−12 chemistry teachers. This could involve local, regional, or national conferences; Webinars with continuing education units (CEUs); workshops with CEUs; expert "technical support" by phone or e-mail; and mentoring from experienced classroom teachers.

AACT ORGANIZATIONAL STRUCTURE

The AACT will have its own governing board, reporting to the ACS Board of Directors, but it will also work with staff in the ACS Education Division. The assistant director for the AACT will report to the director of the ACS Education Division. Other ACS entities, such as the Society Committee on Education (SOCED) and the Division of Chemical Education, will help with the challenge of creating, growing, and evaluating the AACT.

The AACT will serve an important coordinating function that makes resources developed by disparate ACS entities accessible to K−12 teachers of chemistry. The AACT will be the means by which ACS can develop resources, build community, and advocate *with* K−12 teachers of chemistry rather than *for* them.

The ACS Strategic Plan is organized around four goals, one of which is focused on improving education. This goal calls on the ACS to: "Foster the development of the most innovative, relevant, and effective chemistry education in the world." In its recent action, the ACS Board of Directors recognized that the only way to achieve this goal at the K−12 level is to bring teachers of chemistry together, to work with each other to create a classroom environment throughout the United States that is responsive to, and respectful of, the unique needs of this community of professionals, dedicated to the effective teaching and learning of chemistry.

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Notes

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