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Abstract

A university-level course on science, history, and culture of beer and brewing offers students from a wide range of disciplines a unique opportunity to learn from each other. They gain an appreciation for STEAM and the interaction of a number of disciplines while examining a subject of growing interest. This paper provides a brief description of such a course and includes specific examples of ways in which students explore science, engineering, humanities and the arts, as these areas of research come together in the study of beer and brewing.

Author/Artist Bio

John D. Sundquist is an Associate Professor of German and Linguistics at Purdue University in West Lafayette, Indiana where he has been a faculty member since 2002. In his research, he examines variation and change in the history of the Germanic languages. In his teaching, he often teaches German language and culture courses, along with courses on the history of the Germanic languages. Over the last several years, he has also offered a course on beer and brewing in German culture, which he has been developing into different formats, including an online distance learning version and one with a study abroad component.

Keywords

STEAM, teaching, curriculum, history, science, art, culture

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Beer and Brewing in German Culture: Bridging the Gaps within STEAM

John D. Sundquist

The topic of beer and brewing is uniquely situated at the intersection of many areas of research in the arts and humanities as well as science and engineering. Over the last several years, I have taught an undergraduate humanities course entitled "Beer and Brewing in German Culture", and this experience has helped me understand better how this topic serves effectively as a bridge across many gaps between a number of STEAM disciplines. This paper highlights some of the benefits of offering a course about beer's history, science, and culture at the university level. It includes a general description with some specific examples of how the topic allows students and teachers a unique opportunity to integrate science and technology into the arts and humanities.

The main goal of the course is to provide an overview of several different aspects of beer and brewing in German-speaking culture. Students first learn about the science of brewing, focusing on the different steps in the brewing process and the role that each ingredient plays in shaping beer styles and brewing techniques used by German brewmasters and tavern owners since the Middle Ages. The course also examines the role of beer in shaping the identity of regional areas in Germany, Austria, and Switzerland, its place in literature and in monasteries and medieval cities, and its influence on religion, economics, and politics.

One of the benefits of the course is that it attracts students from a wide spectrum of disciplines. For students in such fields as biology and chemistry, topics like fermentation, hop varieties, and types of barley are of direct interest. Engineering

students have an opportunity to observe how refrigeration, bottling technology, and advancements in brewing vessels have impacted the modern brewing industry. Lastly, students with a background in history, medieval literature, Germanic studies, or economics explore areas of interest to them more deeply, including the role of beer and alcoholic beverages in early Germanic mythology and literature, the religious aspects of beer and wine in medieval monasteries or taverns during the Reformation, and changes in attitudes towards regional vs. national identity during the period of industrialization in Europe. For all of these students, however, the course is not meant to be merely multidisciplinary, with separate units that limit students in their exploration of only one aspect of beer at a time. Instead, students explore how their own areas of study are intricately connected to and shaped by other disciplines in dynamic ways.

As an example, the portion of the class that deals with brewing in the 15th and 16th centuries highlights how history, science, and economics collide. In the present day, most people associate German beer with southern cities in Bavaria like Munich (and its famous *Oktoberfest* and *Hofbräuhaus*). But this was not always the case. The true cradle of German beer in the late Middle Ages was in northern Germany. For instance, Hamburg had 457 breweries in 1374 while Munich had only 40 (Unger 2004, 122). Students are confronted with the question: why did the beer industry take off in Germany at all, particularly in the north? The answer to this question lies in both the historical circumstances of the Hanseatic trade league and in the characteristics of the hops plant. Northern cities, such as Hamburg, were able to establish a large and successful brewing industry in part because they took advantage of the vast network of shipping routes between Hanseatic cities to transport hops and to trade hop-brewed beer over long

distances. However, this would have been impossible without the discovery of the preservative qualities of hops, which prevented contamination and made beer more durable during long journeys by sea. Thus, the breweries in the North began the tradition of using hops more readily in their beers, and the hoppy, bitter character of northern German beers (accentuated by the hard water of the region) persists to this day, long after the practical considerations have ceased to be a limitation on beer brewing styles.

Without a more thorough discussion of the characteristics of hop plants, only one half of the story of the origins of German beer can be told. In terms of a course on beer, students gain an appreciation for the complex interaction of STEAM fields in this lesson, not only by examining the historical and economic aspects of the brewing industry but also by considering the biological characteristics of the ingredients that came into play.

A second example comes from a portion of the course that deals with the state of medical knowledge in the Early Modern period in Germany and the limited understanding of the effects of alcohol as depicted in the art of the 16th century. As Ann Tlusty describes in her book, *Bacchus and Civic Order: The Culture of Drink in Early Modern Germany*, physicians and scientists in the 16th century followed the Aristotelian and Galenic medical traditions so common in the Renaissance, assuming that the body was governed by the four humors associated with the four elements (earth, air, fire, and water) and the resulting four temperaments (melancholy, sanguine, choleric, and phlegmatic) (48). As Tlusty (2001) points out, in the mind of the Early Modern physician and those who drank beer or wine, drunkenness and alcohol were not described in objective terms of blood-alcohol content or the amount of fermented sugars; alcohol was something that disrupted the balance of humors in the body, either intensifying

certain temperaments or diminishing others, depending on the type of drink and the normal temperament of the individual (55). In other words, according to medical writers of the time, a cool, watery drink like beer might make those who are calm and submissive more phlegmatic and drowsy, while a drink with more fiery character like brandy would make those with choleric temperaments more unfriendly and irritable (54).

This Early Modern view of alcohol's effect on the body is also revealed through the analysis of 16th-century German art. Erhard Schoen's woodcut "The Four Characteristics of Wine" from 1528 (Tlusty 2001:59) portrays each of the four temperaments and the corresponding types of animals and alcoholic drinks that can be associated with them. Argumentative soldiers draw their weapons against each other, representing the choleric temperament, while sleepy farmers sit lazily around a table with pigs, symbolizing the phlegmatic characteristics. By means of art from this time period, students are able to contrast the Early Modern understanding of the effects of beer and wine with that of the present day, viewing these differences through the lens of art history.

In addition to these topics that focus more heavily on historical aspects of brewing science, students explore more contemporary issues related to beer and brewing in German-speaking society. These units include discussion of attitudes towards alcoholism and binge-drinking in German culture, cross-cultural comparison between laws that regulate drinking and driving, and an analysis of beer advertising strategies in Germany vs. other countries. Lastly, students examine the role of the 500-year-old German Purity Law (*Reinheitsgebot*) in the current German beer market, contrasting the innovative, booming, craft-brewing industry in the United States with the struggling, traditional beer

industry in Germany.

As evidence for the popularity of this type of interdisciplinary STEAM course, one need only look at the broad spectrum of undergraduate majors that it attracts from various disciplines. Although the course is offered as a humanities elective, it draws from a pool of students in departments throughout the whole university: Art History, Food Science, Religious Studies, Mechanical Engineering, Agricultural Economics, Philosophy, Mathematics, and Biochemical Engineering are just some of the majors of recent students. Students in the past have decided to go study abroad in Germany after taking the course, or take on internships with regional breweries in the US, or even start their own craft breweries. The success of the course, however, cannot be measured only in terms of the career paths of some individuals or in how popular the course has become. Instead, one should look at how many new opportunities are made possible by this course, to bring students together to learn from each other. The course offers a unique chance for students to explore how their field of study is relevant to a topic of interest to them, but also, how so many of the STEAM disciplines are intertwined and dependent on each other in interesting, new ways.

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