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### **Logic and Jesuit Secondary Education in the United States**

The benefits of teaching formal logic at the high school level are largely unstudied, particularly in the United States. Yet, the transferable skills associated with formal logic are undeniable: improved critical thinking, argumentation, and the clarification of abstract topics, to name a few. The purpose of this paper is first to consider whether, based on both historical documents and current trends within secondary schools of the Society of Jesus, as well as a brief literature review, formal logic should be introduced in Jesuit high school classrooms in the United States. Secondly, in this paper, I will discuss what, if any, types of formal logic might be beneficial.

#### ***The Constitutions of the Society of Jesus and the Ratio Studiorum***

Two key documents exist regarding the historical perspective on teaching logic in Jesuit institutions of secondary and higher learning: The *Constitutions of the Society of Jesus* and the *Ratio Studiorum*.

St. Ignatius Loyola spent the last 16 years of his life composing the *Constitutions of the Society of Jesus*<sup>1</sup>. His intention was not only to provide some sense of a “rule,” as the vast majority of other major religious orders of the time had, but also to provide a compliment to the lifelong formation and growth in prayer afforded Jesuits through the *Spiritual Exercises*. Indeed, the constitutions are a dynamic document, used to aid the Society in its organization and governance as it strives to remain relevant and respond to the signs of the times. Part IV of the

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<sup>1</sup> Padberg SJ, John, Ed. *The Constitutions of the Society of Jesus and their Complimentary Norms*. The Institute of Jesuit Sources, St. Louis, 1996.

*Constitutions* discusses in part the role and scope of schools as part of the mission of the Society of Jesus.

The study of logic makes three distinct appearances within Part IV. First, in regards to scholastics of the Society, IV.5.351 states, “And since, generally speaking, help is derived from the humane letters of different languages, logic, natural and moral philosophy, metaphysics, scholastic and positive theology, and Sacred Scripture, these are the subjects which those who are sent to the colleges should study.” It is important to note here that “college” in the mid-to-late 16<sup>th</sup> century more closely resembled our understanding of secondary school regarding structure and rigidity of curriculum, as well as age of the students<sup>2</sup>. The *Constitutions* clearly place the study of logic among important subjects to teach scholastics of the Society.

These scholastics, however, are unique among the students of the 1600’s in that they are engaged in priestly formation. What of non-Jesuit students (called hereafter “externs”)? This question leads to the second mention of logic. Regarding the university curriculum, IV.12.451 makes clear the place of logic: “Logic, physics, metaphysics, and moral philosophy should be treated...” Here, logic is made a priority for all students at the university level, where students may be between 16 and 21 years of age.<sup>3</sup>

The questions of priority of logic in the curriculum of Jesuit school and who should study logic have been answered. Thirdly, though, the *Constitutions* consider what type of logic should be taught. IV.14.470 reveals, “In logic, natural law and moral philosophy, and metaphysics, the doctrine of Aristotle should be followed, as also in the other liberal arts.” In conclusion, the *Constitutions* make clear the need for education on logic at Jesuit colleges and universities for both scholastics and externs.

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<sup>2</sup> Lucas, Tom SJ. Lecture: “The First Companions.” Denver, CO. July 2013.

<sup>3</sup> Ibid.

The *Ratio Studiorum* of 1599<sup>4</sup> was composed as a response to the growing network of Jesuit colleges and universities, and sought to provide curricular direction and standardization among schools. In 1543, the Jesuits ran one school. By 1599, they ran 245 schools. And, at the time of the suppression of the Jesuits in 1773, they ran more than 800 institutions of secondary and higher learning (in comparison, according to Alan Farrell, SJ in his introduction to the English translation of the *Ratio Studiorum*, there were 4,059 Jesuit schools with nearly 1,000,000 students in 1960; there was no document that unified curriculum at these schools). It was clear then that they needed some direction to ensure the quality of education would persist.

Teaching logic was primarily the responsibility of the Professor of Philosophy, part of the Higher Faculties. Under the “Rules of the Professor of Philosophy,” he is expected to provide a limited introduction to logic in the first year, discussing: “...the general concept of universal ideas. Similarly, he should discuss only the easier of the predictables, which are usually taken from Aristotle...he should explain as fully as need be the notions of analogy and relations...he should cursorily cover the second book [of] *On Interpretation* and both books of *Prior Analytics*, except the first eight or nine chapters of the first book.” One might conclude from these rules that, particularly in the earlier stages of university-level education (which would be the age-equivalent of upper-classmen at current high schools), knowledge of Aristotelian logic was expected. And, toward the end of higher studies, students of metaphysics and physics should “be able to defend theses in physics and logic,” suggesting that a depth of knowledge in logic would ultimately be a part of the philosophy curriculum.

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<sup>4</sup> Farrell SJ, Alan P. *The Jesuit Ratio Studiorum of 1599: Translated into English with an Introduction and Explanatory Notes*. Conference of Major Superiors of Jesuits, Washington DC, 1970.

One can conclude from the commentary on logic in both the *Constitutions of the Society of Jesus* and the *Ratio Studiorum* that it was an essential part of learning at Jesuit schools from the beginning of the Jesuit venture in education.

### **Current Trends in US Jesuit High Schools**

While, for the purposes of this paper, not every Jesuit institution of secondary education was contacted regarding their full curriculum, Fr. James Stoeger SJ, President of the Jesuit Secondary Education Association (JSEA), offered valuable insights in seeking answers to the question of whether logic is taught at US Jesuit high schools today. His short answer was *no*: logic is not taught at US Jesuit high schools. He suggested, however, that a sampling of schools be contacted to see whether logic was taught in part through courses focused on more generic and common subjects. Curricular information was obtained from St. Ignatius College Prep (SICP) in Chicago, Saint Louis University High School (SLUH), Boston College High School (BCHS), Marquette University High School (BCHS), Gonzaga College High School in Washington, DC (GCHS), St. Joseph's Preparatory School (SJPS), Regis High School in New York (RHS), Christo Rey High School in Chicago (CRHS), and Arrupe High School in Denver (AHS)<sup>5</sup>.

Of these schools, four (SICP, SLUH, SJCP, and GCHS) have philosophy coursework as part of the curriculum, either as an integrated component of a larger theology course, or as a specific moral philosophy or ethics course. Aristotelian logic makes very limited appearances in these courses. All the schools have computer science coursework of some kind, but to varying degrees of rigor and course offerings. Specifically, SICP, SLUH, GCHS, and SJCP offer courses

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<sup>5</sup> All websites containing curriculum information for US Jesuit high schools can be found via hyperlink at [www.jsea.org](http://www.jsea.org). Supplementary information was obtained via phone call to JSEA in Washington DC and Arrupe High School in Denver, CO.

geared specifically toward computer programming in a variety of programming languages; presumably, some sort of instruction regarding the formal logic components of computer programming are offered. The two Cristo Rey schools surveyed (CRHS and AHS) have limited opportunity in their curriculum to offer electives of any kind, due to the fact that students are in the classroom four days a week. While seek specific clarification regarding logic in the mathematics curriculum, it is reasonable to assume that the idea of proofs is present at some point.

Beyond US Jesuit high schools, it is difficult to find information on whether logic has a place in other private or public schools, which might lead one to believe that its place is determined district by district and schools by school. Chicago Public Schools, for example, has several magnet schools that teach logic; this does not, however, show that logic has a solid foundation in, nor any momentum toward becoming, part of high school curricula on a large scale. Research showing whether or not this would be beneficial is largely absent from social or applied science research in the United States.

## **Review of Literature**

Most studies asking the question of whether teaching logic at the high school level is beneficial are completed outside the United States, and deal with logic found primarily in mathematics. A study by Greek scholars Artemis P. Morou and Nicholas A.E. Kalospyros<sup>6</sup> state through their own review of literature that “student achievement with respect to implication, quantification and logical structures -indeed invaluable for students’ mastering the proving process- is relatively low.” They conclude in their study that “a course in logic across the high school curriculum provides an excellent opportunity to develop students’ high-level reasoning

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<sup>6</sup> Morou, Artemis P., and Nicholas AE Kalospyros. “The Role of Logic in Teaching, Learning, and Analyzing Proof.” *The European Society for Research in Mathematics Education*. Paper presented at CERME7, Rzeszów, Poland (Feb. 2011).

skills so that they correctly apply them to actual reasoning situations.” Scholars Dan Bouhnik and Yahel Giat from the Jerusalem College of Technology conducted a study<sup>7</sup> at a private Jewish high school which taught a course grounded in applied logical tools to students at junior and senior levels. They concluded that their students improved in applied logical reasoning, and that “the ability of students to improve their critical thinking stresses the need for students to acquire critical reasoning skills at the high school level.” This need can be met in part through teaching applied logic. Finally, a major study<sup>8</sup> by French scholar Zoé Mensil concluded, “In France today the new syllabi for high school give goals concerning mathematical notations and reasoning, and mathematics teachers have then to explicitly teach some notions of logic.” These studies are few, but compelling.

One major (but older) study by American scholars sought to answer the question, “Do propositional logic and the formal operational schemata ‘develop’ together gradually during adolescence (Lawson, Karplus, and Adi (1978)<sup>9</sup>?” The rough conclusion is that yes, students develop these skills over time, and that “The gradual but steady increase in older students’ ability to use propositional, probabilistic, and correlational reasoning argues that these reasoning abilities are not acquired as a result of any direct and/or short-term teaching programs.<sup>10</sup>” This result would suggest, for the purposes of this paper, that a specific course in propositional logic would not ultimately improve chances for students to gain critical thinking skills closely related to various forms of logic. This study, however, prompted several critical responses, primarily in

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<sup>7</sup> Bouhnik, Dan and Yahel Giat. “Teaching High School Students Applied Logical Reasoning.” *The Journal of Information Technology Education: Innovations in Practice*. Volume 8, 2009.

<sup>8</sup> Mesnil, Zoé. “New Objectives for the Notations of Logic Teaching in High School in France: A Complex Request for Teachers.” *The European Society for Research in Mathematics Education*. Paper presented at CERME7, Rzeszów, Poland (Feb. 2011).

<sup>9</sup> Lawson, Anton E., Robert Karplus, and Helen Adi. “The Acquisition of Propositional Logic and Formal Schemata During the Secondary School Years.” *The Journal of Research in Science Teaching*. Volume 15, No. 6, 1978. Pg. 466.

<sup>10</sup> Ibid Pg. 476.

regards to the validity of the evaluative tool, thus criticizing the initial question and hypothesis of the primary study<sup>111213</sup>.

More generically, there is much literature regarding the need to infuse high school curricula with skills development in critical and creative thinking, if for no other reason, than to prepare students for success at the college level. As an aside, most Jesuit secondary schools are geared specifically toward helping students attend and succeed in college. One such study is by Swartz, Fischer, and Parks (1998)<sup>14</sup>, who suggested that curricula built around critical thinking eliminates lack of focus, which will be beneficial in higher education. Pascarella and Terenzini (1991)<sup>15</sup>, two scholars famous for their work on literature regarding success in and learning outcomes associated with college and university students, report that studying critical thinking at the high school level provides a necessary framework for advanced critical thinking at the college level. In other words, the earlier a student gains skills in critical thinking, the better. Paired with the results of previously mentioned studies, logic may be a good way to begin building those skills at the high school level.

### **Questions and Implications**

So far in this paper, I have shown that there is a tradition of teaching logic in early Jesuit colleges and universities. These schools provided what today is the rough equivalent of later

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<sup>11</sup> Treagust, David F. "Comments on 'The Acquisition of Propositional Logic and Formal Schemata During the Secondary School Years.'" *The Journal of Research in Science Teaching*. Volume 16, No. 4. 1979.

<sup>12</sup> Lamb, William G. "More Comments on 'The Acquisition of Propositional Logic and Formal Schemata During the Secondary School Years.'" *The Journal of Research in Science Teaching*. Volume 17, No. 4. 1980.

<sup>13</sup> Griggs, Richard A. "Further Commentary on The Acquisition of Propositional Logic and Formal Schemata During the Secondary School Years.'" *The Journal of Research in Science Teaching*. Volume 19, No. 4. 1982.

<sup>14</sup> Swartz, R. J., Fischer, S. D., & Parks, S. (1998). *Infusing the Teaching of Critical and Creative Thinking into Secondary Science: A Lesson Design Handbook*. Pacific Grove, CA: Critical Thinking Books and Software.

<sup>15</sup> Pascarella, E. T., & Terenzini, P. T. (1991). *How College Affects Students: Findings and Insights From Twenty Years of Research*. San Francisco, CA: Jossey-Bass.

high school and undergraduate education. Presently, that tradition does not persist in any formal way at US Jesuit high schools. This reality is likely a result of the history of the Society of Jesus, through the loss of its many colleges and universities at the time of the Suppression of 1773, the Restoration of 1814 and subsequent reformulation of educational priorities and principles within the Society, as well as significant changes to the American educational system, including federal regulation and the advent of the public school system, and the innovation of charging tuition at private secondary and post-secondary institutions.

Contemporary research, though limited, suggests that formal logic would be beneficial at the secondary level, and in considering learning objectives and outcomes that lead to success in higher education, it is imperative that critical thinking skills are taught well before higher education begins. Does all this mean that formal logic should be taught at US Jesuit high schools? In short, I do not know.

If it were to be taught as a class unto itself, the benefit of teaching syllogistic logic would be threefold. First, it would introduce students to the original system of logic, which is Aristotelian, and which was developed over 2000 years ago. This knowledge is essential in considering the canon of liberal arts education. Second, it would introduce in a formal way common concepts in the academic world, including Venn diagrams, simple syllogisms, and basic translations of symbolic and English-based arguments. Third, it would provide a clear gateway to skills that are common in other academic disciplines, including rhetoric, arithmetic, computer programming, and philosophy. These surely are benefits of teaching a course on logic.

If it were not specifically taught as its own course, it would be beneficial to explicitly work lessons on logic into already existing courses within the typical high school curriculum. Specify a lesson as logic-based in nature when it comes up in math, public speaking, writing,



computer science, and theology / philosophy courses. Help students understand the power of critical thinking and argumentation above and beyond their usefulness in one academic area or the other, and teach the universality of sound logic and argumentation across the high school and college curricula, as well as their practical applications in the professional world.

Further research questions could focus on where logic is specifically present in US Jesuit high school curricula, and whether the subject is given adequate attention as a component of essential skills needed for future success. Additionally, a more generic study could be conducted about the critical thinking skills acquired at Jesuit high schools in the United States.

## **Conclusion**

Ultimately, the one key piece of the argument I see about whether logic should be taught at US Jesuit high schools lies in the historical academic approach of the Society. As the Society holds to the original *Constitutions* in a multitude of other ways, it would be at the very least valuable to assess whether we should consider our traditional educational models and pedagogy in this matter. In our world today, media of all kinds plays to the emotional; something is lost in the realm of clear statements that lead to understanding of simple truth. In Plato's *Apology*<sup>16</sup>, Socrates, after receiving a death sentence, states: "I was convicted because I lacked not words but boldness and shamelessness and the willingness to say to you what you would have most gladly heard from me, lamentations and tears and my saying and doing many things that are unworthy of me but that you are accustomed to hear from others." Logic, in some form, must be clearly taught to ensure that the very best combination of reason and appeal posies our students to be successful, however they may determine it, but always in the best interest of the other. Indeed, this was the initial aim of the documents outlining the goals and expectations of the schools that still serve as the foundation of the Society of Jesus in the United States.

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<sup>16</sup> Cooper, John M. Ed. *Plato: Complete Works*. Hackett. Indianapolis / Cambridge. 1997.