Designing the Research Commons: Classical Models for School Libraries

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School libraries and media centers today are embracing the idea of the "learning commons," an approach to learning which makes use of the facility's physical openness and group meeting places to facilitate current shifts towards computer-based resource sharing and collaborative student projects. How can libraries yet to make this transition reverse a prior, mid-twentieth-century architectural bent toward segmentation of school library resources from the surrounding institution, and implement a more inclusive school library design? The open library paradigm is shown to represent a return to the principles of the earliest democratic libraries and repositories in the Western tradition. A qualitative metasynthesis of both the literature of library architecture and of the history of school libraries was undertaken in order to increase librarians' awareness of classical forms which influence design decisions into the twenty-first century.

Introduction

School librarians today perform many activities in their libraries including reference, cataloging, research instruction, reader's advisory, collection development, and facilitating group discussions. One or two school librarians may carry out these functions which in larger library institutions are assigned to dozens or hundreds of librarians. Additionally, school librarians today coordinate their work with academic teachers and with school-wide developments in curricula and learning techniques. Studying individual school libraries reveals them to serve as a kind of professional microcosm with valuable corollaries for the librarianship profession in general.

As school librarians and principals consider the role and function of school libraries in the life of an institution, an awareness of architectural elements which support desired outcomes can be valuable. In the 1990s, library administrators proposed that academic libraries reinvent their services to support student learning by providing access to electronic resources. In their view, the research commons would enable librarians to assist students in interacting and learning with digital technologies, while also provisioning space for small group work, projects using digital (and nondigital) technologies, and tutoring in various subject areas. Since the first discussions of the "learning / information commons" in that

decade (Beagle, 1999; White, Beatty, & Warren, 2010), librarians continue to incorporate developments in facilities planning and investments in technology as key components, and the idea of the commons is steadily being adopted in school libraries. Bennett (2003, p. 37-38) defines "learning commons" and "information commons" separately, but in this paper, I reflect the term used by the source consulted, and also I acknowledge that both schools and school libraries are oriented toward younger (K-12) students' learning.

With the framework of the school learning commons in mind, this study seeks to integrate examples from classical libraries, from libraries of the Middle Ages, and from nineteenth-century American libraries into the discussion of a commons, with a goal of informing future design decisions in school library facilities. As in architecture more generally, library architecture may be guided by three notions which reflect the surrounding environment: structure, utility, and beauty, or as the Roman Vitruvius stated, *firmitas*, *utilitas*, *venustas* (Bruce, 1986). Recognizing both the role of the library as a central meeting space and the increased use of digital tools to conduct academic research, librarians and administrators continue to transform the library space into an "information commons," an environment which fulfils needs for work and study spaces while making accessible organized shelves and exhibitions of materials by adopting an open design principle. This principle is explored in a qualitative metasynthesis of research on library architecture and the evolution of school libraries, beginning prior to ancient Greece.

The concept of open design in architecture is identified by synthesizing examples from the Western library literature, chronologically to the present day, and by making connections with scholarship in classical studies. Particular implications for designing research commons are highlighted so as to guide administrative decisions in schools. This study fosters comparisons between the forums of the ancient world, the writing desks of cathedral libraries, and the research commons of today. In examining the spectrum of physical design through these ages, this study establishes the relevance of the Greeks and Romans' democratic ideals and provides thematic grounding for the openness principle in historical continuity.

School Library Architecture: Form and Function

Library architecture is shaped by the requirements of the items held by the institution, the needs of its patrons, and the methods in use for delivering library resources between librarians and patrons. As physical extensions of the "politics of culture, knowledge, and information of different societies" (Dahlkild & Ploug, 2010) within which they are situated, library buildings affect greatly the research experiences gained by the library's patrons. From the controlled "memory theater" library of the Renaissance period, to the grand library design of European countries in the nineteenth century, libraries have served the desired aims of cultural and political leaders. At the turn of the twentieth century, city libraries in the United States and elsewhere began to advance the concept of openness through the construction of open shelves which permitted browsing of full collections.

School libraries too have historically extended the politics of their surrounding institutions, but the smaller scale of their activities has until relatively recently hindered proportional scholarly analysis of their form and function. For instance, some surveys of library history failed to consider the extensive background of school libraries--ascribing to them words such as "feeble" and "primitive"--and dismissed their early origins ostensibly because the earliest incarnations did not exhibit the same teaching-intensive activities associated with school libraries today (Gates, 1976; Johnson & Harris, 1976). Despite these early oversights, both school libraries and the provision of school library services as we know them have a documented etiology at least from the eighth century forward (Clyde, 1981, 1999). School reading practices began even earlier, such as in the third and second century BCE in *ephebia,* the schools preparing freeborn youth for citizenship, such as the Ptolemaion in Athens (Johnson & Harris, 1976; Marrou, 1956). A similar case is observed in the ancient cities of Sippara and Nippur, where excavators have unearthed school exercise tablets dating to as early as 1800 BCE.

While school librarians' provision of service to students attending the school is well-known, school libraries have also served broader community purposes often unrelated to

school instruction, such as meeting the recreational reading needs of students' parents and other adults (Stam, 2001). School library practices have helped democratize public knowledge in this way into this millennium, even as digital portals increasingly overtake physical book browsing as patrons' initial access mechanism. The "information commons" movement began when instructional faculty recognized that the introduction of personal computing, consumer software, and the World Wide Web in 1993 exerted "profound" impacts on research and libraries (Bennett, 2003, p. 4). As one researcher notes, "only after 1995 were librarians and architects able to factor the emerging web environment into facilities planning" (Silver, 2007, p. 18).

Library leaders at both the school and college/university level articulated new roles and services that would reaffirm their libraries' continued relevance and realign with their students' research needs. The information commons has been defined as a library feature which offers "access to the richest possible set of information resources ... [and] staff with expertise in information resources and technology who offer both one-on-one and group instruction" (Bennett, 2003, p. 38). From concept to practice, librarians in consultation with architects effected a pronounced shift in the library model towards a new focus on the patron experience by building inclusive learning environments. They designed computing spaces for both individual and group work. Recognizing the value provided by peer learning, school tutoring programs would be relocated to library spaces which are "inviting, roomy, and equipped with whiteboards and computer access," and group projects would be facilitated within spaces "configured for use by small groups of students, reflecting students' desire for collaborative learning and combining social interaction with work" (Oblinger, 2006, pp. 4.14 & 7.3). The first information commons, when they appeared in the late 1990s, reflected a dramatic change in emphasis from collection-focused to user-centered design. Elsewhere, it is suggested that the "first *school* learning commons" appeared in practice in 2008, which would follow the first implementations of the concept in universities by about a decade (Loertscher, 2010).

Having evolved from single back-room terminals equipped only for staff librarians' data input and early automation activities, computers in libraries today are placed front and center, purposed for patrons' searching and browsing of library collections and general knowledge (Kilgour, 1970; Veaner, 1974), especially in secondary schools (Flora & Willhardt, 1969). In part, these practices have mirrored societal transitions towards web access and students' increased aptitudes for social media which go beyond the Internet's initial one-way delivery mechanism. Yet, while the learning commons has been shaped by digital technologies, its concept actually hearkens in origin to the classical democratic establishment of public spaces and centers for knowledge exchange. The historical origins of our physical interactions with print resources and open access can be traced back several millennia.

The Athenian Agora and Roman Book Collections

The practices of Greek and Roman civilizations have great relevance to the current work of school libraries. Still, they are not the earliest civilizations for which we have archaeological evidence, and school library history begins even earlier. In 1974, excavations of the ancient city-state of Ebla in northern Syria found over 15,000 clay tablets with cuneiform script dating from about 2600 to 2300 BCE. Like a majority of ancient collections which predate the Library of Alexandria, the Ebla materials likely constitute an "archives intended solely or chiefly for the use of kings, their ministers, and their bureaucracy" (Wellisch, 1981, p. 494) but some purely literary and lexicographic materials were also found: 32 bilingual dictionaries, syllabaries (words and pronunciation), itemized lists and such forms of literature as hymns, incantations, epics, mythological themes, and proverbs. The materials are noteworthy for the knowledge they contain regarding the invention and development of writing (and its employment in the organization of libraries), and in Biblical scholarship (Dearman, 1989).

School collections have also been excavated which date to the Old Babylonian period. A school collection from ca. 1800 BCE was excavated at Sippara (north of Babylon, in modern-day Iraq) in 1894, and accessioned by the Istanbul Archaeological Museum. This collection contains a ground plan of its ancient school, which faced a temple, and in one of the rooms, excavator Jean-Vincent Scheil found

> an enormous compact mass of tablets of all sorts, Sumerian hymns, syllabaries, contracts, all of about the time of Hammurabi and many of them giving evidence of having been used as exercises. He then searched every corner of the building and found fine tablets in all the rooms but none in the adjoining rooms of other buildings. It seemed clear, therefore, that here was a distinct school and *school library*. (Richardson, 1914, p. 47)

Additionally, "school equipment of tablets ... writing exercises, syllabaries, multiplication tables ... and literary works" were also found at Nippur in 1888-90 by John Punnett Peters dating to ca. 1200 BCE (Peters, 1897, p. 210; Robson, 2001, p. 50). Although these findings improve our understanding of educational history, there is no evidence yet to suggest that these school collections received the services of a school librarian. One of the earliest library buildings for which archaeologists have unearthed extensive documentation is that in Nineveh of the late Assyrian Empire king Ashurbanipal in the 600s BCE (Gormley, 1974). Within two rooms (one each perhaps for public and private access) were housed thousands of clay tablets arranged in a "classified order" by, presumably, a librarian.

The school commons is a descendant of the Athenian Agora and the Roman Forum in the ancient world, open places where citizens gathered to share and exchange goods, services, and conversation, and youths convened for academic lessons. Within the *agora*, the open "gathering place" of the city of Athens, the trading and selling of books is documented as early as the late fifth century BCE in Greece, when Aristophanes (in the *Birds*) and Euripides (in the *Erechtheus*) write about bookshops and booksellers. Fourth-century BCE works of Socrates (*Apology* 26d), Satyrus (in *Diogenes Laertius'* 3.9), and Lucian (58.19) relate scenes of the agora involving citizens' commercial exchanges with rare books, providing evidence of the first private book collections. The biographer Diogenes Laertius (7.31) also recounts the story of a young Zeno reading Socrates' *Memorabilia* within his father Mnaseas' Athenian bookshop. Several Greek writers amassed personal library collections including, along with Euripides and Euthydemus, those of Mnaseas, Eucleides, Plato's Academy, Polemaenetus, the tyrant Clearchus, Nicocrates (Davison, 1962), and Aristotle.

Adult learning was a public activity in Athens, and both Socrates and Zeno conducted their teaching within the colonnades of the Agora. Formal schooling of Athenian boys was limited to basic concepts of word and number taught in private arrangements by a *grammatistes* and *kitharistes* (language and harp teacher, respectively) only until the age of 14. Of those adolescents who could then afford to pay a *sophistes* or tutor in geometry and philosophy in *ephebia* such as the Ptolemaion in Athens, some cohorts began to contribute a sum of 100 books annually, but this collection received no regular oversight. The emphasis of Greek schooling was to prepare males for entering and becoming masters of their society, rather than to convey any specific training (Hale, 1965). Greeks expended great sums of public money in other areas, such as the building of stadiums, gymnasiums, and theaters. As the needs of its citizenry changed, the Agora accommodated new law buildings and public furnishings (i.e. fountain houses, plane trees) and even a decisive remodeling in 200 BCE which split the Agora into a public square and a marketplace (Thompson, 1954).

Apart from volumes collected by private citizens, the persistent and deliberate *collecting* of books for purposes of creating a center of knowledge remained the concern of a very few places, three of which include Antioch, Pergamum, and Alexandria (some evidence also exists for libraries at Cos and Rhodes). All three capitals' ruling families were eventual heirs to parts of Alexander the Great's empire upon his death, and each capital housed a royal library which was among the first to serve the Greek people. Of the three, the library at Antioch is the least well-recorded in the archaeological and classical literature; it was home to at least one scholar (Casson, 2001).

The Greek library at Pergamum is particularly well-documented; it was created by Attalus I (241-197 BCE) at the top of a hill housing an imposing civic sanctuary to Athena, the goddess of wisdom. At the Pergamene library are recorded four distinctive architectural elements: an outside colonnade "in which to stroll, converse, or teach" (Richardson, 1914, p. 7); an internal reading room with a focal statue of a deity; a storage room with appropriate fixtures (see Thompson, 1940); and an assembly or lecture room. The appearance of one of the Greek or Roman deities within the learning space of the library serves as a reminder of

the pervasive polytheistic religion extolled by the Roman citizenry. The Library adjoins with a Stoa in the front, and an additional statue of the goddess Athena would "have been placed in a still more intimate relation with the books as their guardian" (Thompson, 1937). The Pergamene library served as the source of architectural inspiration for many libraries created during the Roman Empire, even though the Romans let the Attalid-era structure fall into disrepair, and Marc Antony gifted 200,000 of its scrolls to Cleopatra in 31 BCE (Casson, 2001). Some of the Roman libraries inspired by Pergamum's include the Augustan-age Porticus of Octavia and Trajan's Ulpian Library, both discussed in a later section. The Pergamene and later Roman libraries are distinctly characterized by their close adjacency to a *schola*, or conversation hall.

The successor to Aristotle's Lyceum, his Peripatetic School (330s BCE), held a significant number of volumes collected and arranged by him. White (1978) considered Aristotle's collection one of the first libraries, but even Aristotle was not a school librarian in the modern sense. By the time of Aristotle's death in 322 BCE, private papyrus collections flourished among the Greeks--chiefly so in Athens, where widespread literacy is evidenced in plays by the Greek dramatists, vase paintings, and an Athenian tombstone (Casson, 2001; Sickinger, 1999). Classroom scenes depicting youths reading in schools survive in several vase paintings and Greek writings which date to the 400s BCE. Homer's *Iliad* and *Odyssey* were probably first set down in writing in 550 BCE and their prevalent reception across Greece is seen in numerous texts derived from the recitations and dialectic styles of *rhapsodes* from the 300s BCE. Strabo, the scholarly geographer writing in the late first century BCE, attests that Aristotle's amassing of the largest book collection in Greece inspired the Ptolemaic kings in Egypt from the late third century BCE to create the Library of Alexandria (Parsons, 1952). The namesake of Alexander the Great and the capital of Egypt during the Hellenistic Age (331-31 BCE), Alexandria was well-positioned to attract scholars and scientists to its *Mouseion* and thus become a center of Greek culture (Fraser, 1972).

Zenodotus, the first Director of the Library of Alexander, was tasked with shelving the library's monumental holdings in a systematic fashion, and he did so partially by drawing on Aristotle's methods but now on a much grander scale (Casson, 2001). Zenodotus attained much success in his efforts, for he was able to not only assemble the works of Homer with fellow Alexandrian literary critics, but also codify them into a text which was then distributed authoritatively. The *Mouseion* was entirely contained within the royal palace and included elegant living and dining quarters for the scholars, allowing them to engage fully in intellectual and mindful pursuits. The few extant descriptions of the *Mouseion* building attest to its Aristotelian division of knowledge into observational and deductive sciences. Aristotle's peripatetic ideal was reflected in the Library's "wandering" colonnades and open spaces to encourage scholars' wide-ranging conversations (Wright, 2007, p. 70).

As the Library's collection grew from the hundreds to over 400,000 volumes, complementary edifices such as courtyards, botanical gardens, an amphitheater, and a secondary library in the *Serapeum* (which contained copies and was open to the public) were in place by the time of the rule (246-221 BCE) of Ptolemy III (Phillips, 2010). The Library's scholars drew from their full access to the resources of Alexandria and continued to create pioneering scholarship there in literature, the sciences, and language. The scholars were aided by successive Library Directors' development of tools for using the collection, such as identifying tabs for papyrus rolls, Callimachus' *Pinakes*, commentaries, glossaries, lexicographies, and the first grammar book. The Alexandrian Library functioned as the Greek printer, but this and other programs ceased by 30 BCE when Rome took over Egypt.

In Rome's first century BCE, authors circulated a small number of copies of their literary texts among close friends (the number dependent on the transcription abilities of their valued *servi litterati*) or invited such acquaintances to observe and comment on an oral recitation of their work. From these early encouragements, the author then effected the production of copies for small-scale distribution to the author's immediate social circle (Starr, 1987). We can identify two strands of book circulation in the Roman republic: private circulation among literate citizens and public circulation through the imperial public libraries. The public libraries served the needs of literate readers and members of the emperor's inner circle--most of these activities extended only among the upper literate class.

Rome's first public library was founded by the soldier Asinius Pollio, lieutenant of Julius Caesar, in the *Atrium Libertatis* following his military victory in northern Illyria in October 39 BCE (Boyd, 1915; Dix, 1994; Marshall, 1976). Pollio placed a bust of the great polymath M. Terentius Varro in his library's reading room. (The *Atrium* also housed the Office of the Censor). Two early libraries founded by the emperor Augustus--the library of the temple of Apollo on the Palatine (28 BCE) and the library of the Porticus of Octavia (*Porticus Octivae*)--soon followed. Augustus' temple was in peripteral style, carrying a single row of columns on all sides (Boyd, 1915) and its library, adorned with art and sculptures, was within one of the most magnificent structures in Rome. Both temple libraries, like all Roman libraries, were split into Greek and Latin book collections (Richardson, 1914). Augustus, exercising his authority and personal control, barred the works of Ovid (and Julius) from his libraries but commended those of Vergil and Livy (Suetonius 34.2).

Augustus' successor, Tiberius, created the position of library commissioner which firstly imbued a scholarly rather than administrative leadership for the public libraries, and he separated distinct collections rather than combining them (Houston, 2008). Study of the imperial libraries informs our overall knowledge of library architecture because these libraries appeared to follow three fundamental principles common to all Roman buildings, given by Vitruvius in his *De Architectura* 1.3.2: *firmitas* (the skilled use of materials and structural techniques), *utilitas* (the suitability of space and furnishings for activities), and *venustas* (the formal aesthetic and symbolic aspects of structures) (Bruce, 1986). Knowledge of these principles--and their expression in the libraries of the ancient world--demonstrates for us the resiliency of planned architecture and thoughtful consideration of the connections between library use in learning, space and place, and beauty.

Design analysis of the square Imperial Fora has shown that its distinguished axial symmetry and frontality, flanked by colonnades and a temple and embellished by artworks, rests on the Roman architects' use of Greek Euclidean geometry and whole-number arithmetic, concepts preserved to us in Vitruvius' writings (Wightman, 1997). This arrangement greatly facilitated significant governance actions which occurred in the fora, where "the Senate decided on war and peace; here the *toga virilis* was bestowed on the princes of the imperial house; and here the magistrates received their new offices" (von Blanckenhagen, 1954, p. 22). Additionally the fora were backset by the lofty Quirinal Hills and civic buildings which lent to the space a sense of grandeur and civilization. The fora can be thus seen to accommodate a great number of individuals gathered for the purposes of exchanging knowledge and decision making.

Archaeological excavations continue to unearth materials both written and crafted which illustrate aspects of the literary world in the Roman Empire. The works of the biographer G. Suetonius Tranquillus, for one, provide a rich cultural history, and materials found at the ancient site of Hippo Regia (modern Algeria) provide an insight into the direction and organization of Roman libraries. Suetonius served for a short time (114-122 CE) as *procurator bibliothecarum* or *bibliothecis* (library director) under Trajan, and the details given in his writings prove helpful in charting the development of public libraries (that is, any library outside the emperor's home) and library services. The *procurator* was a direct agent of the emperor, and came (beginning in 69 CE with the Flavian dynasty) from the equestrian and freedmen ranks of citizens (the upper class, e.g., Suetonius, and emancipated slaves respectively). Many individuals entered the equestrian class through service in the *tres militae*. Although the role of procurator was appointed, it was unique among imperial appointments by virtue of being nonmilitary; "in the second century the library director was well paid: he was classed as a *ducenarius* [200,000 sesterces], equal in rank to governors in Britain, Spain, and other small provinces in the upper echelon of this grade" (Bruce, 1983).

The first century CE witnessed substantial development of the Roman libraries both in their social status and their scale of operations. The few Roman library plans which have been illustrated by excavators suggest that Roman libraries largely adopted the layouts which had been set in place at the Pergamene and temple libraries. Vespasian, who ruled from 69-79 CE, established the Forum of Peace which became one of Rome's chief libraries. Both a blueprint and a description of this library survive: "the lower [band] was simply lined with marble slabs covered by the bookcases and screens which contained papers, and

records and maps" (Richardson, 1914, p. 208). Trajan's immense Ulpian Library on the Capitoline Hill was part of his Forum; it outlasted both the Alexandrian and Pergamene libraries and consisted of a colonnaded portico which separated the high-vaulted west (Greek) and east (Latin) rooms; the library faced east, following Vitruvius' recommendation (blueprint and reconstruction in Casson, 2001). In particular, the niches in the side walls have a width of just over 1.5 meters and just over a half-meter of depth. These niches accommodated fitted wooden bookcases to hold rolls inside. The Ulpian Library provides significant evidence that Roman libraries were the first designed to accommodate readers through spacious room for work areas, and shelves that were largely out of the room's center (unlike the Greek libraries, consisting largely of stacks). The merging of all of the emperor's property and account activities resulted in several administrative changes in the 220s CE and the closing of the era of the *bibliothecis*.

By the fourth century CE, there were as many as 28 libraries in Rome (Bruce, 1983, p. 153). Evidence suggests that libraries existed at Comum by Pliny the Younger (96 CE), the great bath buildings of Trajan (dedicated 109 CE), of Caracalla (216 CE), and of Diocletian (305 CE) as well (Dix, 1994; 1996). At the further regions of the Roman Empire, evidence exists for libraries in Spain from at least 550 CE and likely much earlier (Hanson, 1989). The individual libraries and their librarians had a certain degree of autonomy and certainly reflected their city's local character.

Medieval to Renaissance Libraries and the First School Librarian
Religious strongholds in England formed the basis for the first libraries in schools, most notably at Canterbury, York, Winchester, and Hexham (Clyde, 1981). In York Minster, when the English secular priest Aelbert was appointed as Archbishop of York in 766, he selected Alcuin to succeed him as head of the episcopal school at York. As schoolmaster and librarian of York Minster (776-780), Alcuin--the first school librarian--oversaw a collection of books and manuscripts assembled by him and Aelbert from travels to Rome. Alcuin later founded a new school in Tours at the invitation of Charlemagne (Moore, 1954). Pupils in King Alfred's court at Winchester, in the ninth century, attended a grammar school, a *ludis literariae disciplinae*, and read from books in Latin and Saxon (Clyde, 1981).

The Middle Ages saw further development of the academic and scholarly world which had blossomed in the Roman Empire. In 330 CE, a significant transfer of power and funds from Rome to Constantinople occurred, where the position of Chartophylax to the Patriarch served as archivist-librarian within the Orthodox Church (Wehmeyer, 1997). Such events reflected larger cultural shifts: "in 400 CE the Latin West was already focusing on what related to the Bible and liturgy; anything else suffered" (Jackson, 1977, p. 355). With the rise of Christianity and monotheism, in not only Italy but also Britain and France, monastic orders and cathedrals replaced the ancient temples.

The Cistercian monks' 11th-century contribution to library architecture, a quite significant one, came in pioneering the placement of storage shelves and book tables inside the formerly bare open spaces of a room. This Christian order also developed dedicated book-rooms which allowed access to greater materials than those few which previously were displayed in small recesses of the cloister (Gormley, 1974). The shelves--stabilized with finely crafted fixtures--lined the book-rooms at right angles to the wall, permitting the addition of study desks and lecterns adjacent to the books themselves.

The founding by Henry VI of the school library of Eton College, per the College Statute in 1440, is also notable as it is one of the two oldest and continuous school libraries in existence today. Two practices for the arrangement of its book collection are specified: one, that the Common Library books be chained, and another, that a separate collection of books be distributed (Clark, 1901; Streeter, 1931)--practices that were "defensive, or to facilitate use," respectively (Thompson, 1969, p. 135). In addition to Christian centers (Tanner, 1979), cathedral libraries developed during the Medieval period (Johnson & Harris, 1976); these libraries are characterized by use of a *scriptorium* for document-writing and an *armarium* for document-collecting.

The fourteenth and fifteenth century Renaissance saw a partial revival of classical forms and studies. One notable library of this era is the Laurentian library of the Medici family designed by Michelangelo; it is elevated and generously lighted on two long sides

(Salmon, 1990). It may be that, during the Renaissance, a new emphasis on criticism and inquiry brought a greater professional focus on the organization and arrangement of books *inside* the library than on its external structure. If so, the practices of the Palace-Monastery library of El Escorial near Madrid (and also to a degree, those at Milan's Biblioteca Ambrosiana) reflect that experimental spirit: the book collection was placed not centrally, but beside the walls of the room, leaving the center space available for portable tables, stands, globes--and people (Gormley, 1974). Soon after, followed the first academic libraries founded at Oxford and Cambridge. Scottish school library history is evidenced to have begun as early as 1658 (White, 1973). In the 1650s, the formation of the university library in Rome's *Studio della Sapienza* followed the recommendation, approved and funded by Pope Alexander, that such a library might enable the students to "profitably spend their idle hours" (Rietbergen, 1987, p.191).

Open Design in Urban American Libraries

Developing from the American colonists' earliest, chiefly theological, personal libraries in the 17th century, the more practical public libraries of the 1800s offered the country's first school library resources (Kraus, 1974; Muller, 2011). American architects began work on the nation's large public libraries and academic libraries in the 19th century. Of particular renown are the stone detailing and arches of H. H. Richardson's libraries in Massachusetts, Charles Follen McKim's alcove and right-angle shelf designs for the Boston Public Library, and the open shelves of Columbia University's Library (Allen, 1976).

From 1870-1930, American institutions of higher education swelled in numbers and in curricular development, necessitating the expansion of bookstacks. Until the 1920s, these open shelves were often accompanied by a "panoptic" arrangement, featuring the librarian and a desk counter at the center of a fan-shaped array. The Thomas Jefferson Building of the U.S. Library of Congress, operational in 1897, reflects this arrangement; at that time it contained 250,000 volumes. The ability to freely browse the library shelves signaled a new opportunity for library patrons to conduct their own inquiries with a certain degree of independence.

Philanthropist Andrew Carnegie's libraries, which reference the architectural plans of his secretary James Bertram's *Notes on the Erection of Library Buildings*, contain six characteristic elements. The most evident is a central flight of stairs, which leads to an elevated ground floor branching into three main areas: a reading room, an adult library, and a children's library (Dahlkild & Ploug, 2010; van Slyck, 1991). Such an architecture recalled classical ideals of truth-seeking and focused philosophical inquiry within a new, neoclassical "temple of knowledge." In the 1930s Angus Snead MacDonald and Ralph Ellsworth championed the modular approach to American library construction (Baumann, 1972; Ellsworth, 1955; Smith, 1980). Following World War II, variations of MacDonald's "modular plan" featuring more compact, flexible spaces for study or shelving (and a de-emphasis on ornamentation) were carried out by Ellsworth and others.

School libraries' growth in the twentieth century can be attributed as much to the development of youth educational standards as to the development of professional standards for school librarians and the responsibilities they perform (Woolls, 2010). A great number of libraries built in the twentieth century employ functionalism and modernism, including perhaps most perceptibly school libraries and media centers.

Implications for Designing Research Commons in School Libraries

Examples from the classical world provide several findings which can inform our current decisions related to library design. In 200 BCE, the Athenian Agora underwent a substantial remodeling which resulted in a split of the space into a public square and a marketplace. The forces leading up to this event primarily stemmed from the public need to decentralize the activities of the agora and repurpose the open space into separate quarters for specific kinds of activities. We may consider this in light of two challenges facing libraries in the 21st century: to "embed" library work closer to the lives and activities of its potential patrons, and to extend the utility of its collections beyond central physical shelves.

In adapting the "information commons" concept, modern school librarians are transforming their spaces into research commons and bringing classroom techniques into the collective library: instructing students in conducting research, developing students' information and visual literacy, facilitating group and club activities, and building resource-based learning. In seeking to transition their library from the "temple of knowledge" model characteristic of the Carnegie libraries, to a learning commons, school librarians may draw upon the concept of openness so as to fully expose the resources held in a library so they are accessible to the greatest number of users. This process is enabled by use of online technologies and catalogs to provide guided access to school library collections through comprehensive subject pathfinders, journal listings, and reference anthologies accessible online from anywhere, anytime. These subject-specific and dedicated resources mirror the development of urban meeting places such as the agora and the forum from relatively unstructured spaces to well-organized centers, while retaining their hallmark democratic principles.

The success of the library at Pergamum suggests that conscious placement of the library near an outdoor environment--whether aided by windows or actual outdoor colonnades and tables--lends a positive and welcoming effect. The natural light which seeps into the library highlights a library's spaciousness and supportiveness of students' learning process. Reading rooms and study carrels can be complemented by additions of colorful student art work, attractive counter tops and tables, or historic materials suitable for central display.

The Pergamene library housed numerous depictions of Athena; school libraries can adopt a more contemporary homage of their choosing by spotlighting institutional history, founders, or important achievements. Anderson (2008) writes that one school library honors its namesake through distinctive architectural touches: "Brick support pillars with limestone tiles depicting Winona add design interest" (p. 34). In bridging the design principles of both openness and individual comfort, a school library can also provide a foyer leading into an enclosed media center, with clear windows allowing views to the outside location. Loertscher (2010, p. 2) suggests that updating library facilities with open spaces and group furnishings can offer "a sense of client ownership."

In an issue of *Library Trends* devoted to library buildings, Bennett (1987) observed that aesthetic values had too often been ignored in favor of functional priorities since the first spate of school library building in the 1960s. (We recall Vitruvius' three equal components, here lacking in *venustas*, or beauty). Bennett further suggests that behavioral expectations be factored into library redesigns and provides several diagrams designed to accommodate traffic flow. Several states have since adopted facilities guidelines (Hallisey, 2003; Maryland State Board of Education, 2000) and best practices do urge the balancing and thoughtful consideration of those aspects of technology, furnishings, lighting, size, building codes, and location most relevant to the needs of a particular school library (Erikson & Markuson, 2007; Johnson, 1998).

The idea of congregating materials in a common library area where they can be easily accessed by patrons is supported historically by the Cistercians' integration of storage shelves and book tables inside the otherwise open room design. Consideration of space requirements for conducting teaching sessions with students and faculty, the ability to accommodate different groups simultaneously (e.g., in a sound-proofed room), the ability for circulation staff to survey the entire library, and the facilitation of appropriate computer equipment with which to evaluate information resources in print, visual, and digital form are some of the stated issues with which school librarians have the most expertise. As there can exist no single "off-the-rack" library building plan, particularly for schools of different student body and community sizes, it becomes essential that librarians be involved in applying the stated philosophy, role, and services of their library towards designing a functional space for patrons (DeMelle, 2010). Like Michelangelo's designed library, stylized separately from the surrounding institution, modern-day school libraries frequently contain a high volume of materials which can lend an individuality from the rest of the school. The accommodation and placement of groups in distinct places within the school library – such as in a separated, sound-proof room or media center--resembles, historically, the earliest

cathedral libraries which had both a *scriptorium* (for document-writing) and an *armarium* (for document storage).

The emergence of the Internet and digital library services has influenced the allocation of space within libraries for specific activities, as well as reference services offered both online and in-person. School and academic libraries balance space allocations for both computers and for study areas, and several factors may influence the quantity of computers in a particular library. The percentage of students using personal laptops, a school's media policy, the relative emphasis of handwriting and fine motor skills in assignments, on-site software and user licenses, and a school's wireless network – all these considerations may influence the use and availability of computers in libraries (Malone, Levrault, & Miller, 2007). Just as the introduction of open bookshelves in the 1900s in American libraries gave patrons a new level of independence in accessing library resources, so too do many school libraries permit their student patrons to freely explore all manner of printed materials which are held, organized by subject, and librarians encourage students to seek assistance in locating materials. Along with fulfilling patrons' information needs, school librarians also provide service and more general advisory to patrons on an individualized basis. As a visible component of a primary and/or secondary education institution, the research commons, when it is physically located in the library, supports the exchange of ideas, materials, and books in a localized manner analogous in function to the ancient agora and marketplace.

Particularly elegant school libraries, such as those designed in concert with the school's natural surroundings, also recall the design and embellishments of Rome's Imperial Fora. The emphasis on beauty and style is most pronounced in some boarding school libraries, which accommodate more extensive student time than day school libraries. School library collections also are often housed in fitted shelves against walls (largely a development of the Roman libraries), which open the central library space for student readers to prepare their work and collaborate.

In addition to our classical architectural legacy, the naming of several authoritative information resources remains indebted to the mythological tradition of the Greek and Roman pantheon. The Latin and Greek languages continue to provide librarians and faculty with a rich vocabulary useful in the creation and communication of many projects and digital initiatives. Classical sources lend their names to many digital resources worldwide including the AGORA (Access to Global Online Research in Agriculture) journal collection, ARIADNE collaborative browsing project, ATLAS journal catalog (of American Theological Library Association), Cassandra programming system, CERES Project (Center for Educational Resources, with NASA and Montana State University), EURIDICE project (EUropean Recommended materIals for DIstance learning Courses for Educators), Galatea (a visual content structuring software package), HELIOS digital archive (Heinz Electronic Library Interactive Online System at Carnegie Mellon University), HERMES (Hopkins Electronic Resource Management System), HESTIA (Herodotus Encoded Space-Text-Imaging Archive), commercial Hyperion computers and software, the JANUS data repository (National Cancer Institute), MINERVA (Library of Congress Web Archiving Project), Orpheus (On Line Alinari Photographic Archives For European Educational System), Pandora (Australia's Web archive), the PELAGIOS Project (Pelagios: Enable Linked Ancient Geodata In Open Systems), Perdita Manuscripts Project (at Warwick University), Perseus Digital Library, Pleiades set of linked place and name data, Pliny note-taking application, and SPQR (Supporting Productive Queries for Research) resources for the semantic web and linked data.

Conclusion: School Library Design as Evocation

School libraries support a range of learning activities: collaborative scholarship is enabled by group meeting spaces, and open book stacks permit browsing and chance selection of research topics; and global analysis is aided by real-time Internet audio and visual communications. Libraries support general inquiry as well as subject-based learning; that the librarian is "really the most important teacher found in the entire school" has long been recognized by school principals (Portwood, 1936). By incorporating and modernizing design

elements to reflect a fuller spectrum of knowledge suited both for academic research and personal enjoyment, librarians and teacher colleagues can connect and pursue shared educational goals. In adapting the information commons concept for school libraries, librarians facilitate students' transition from schools to universities, and librarians help centralize students' access to those technology tools, information sources, and human resources essential to academic life (Ernst, 2010).

From the early days of the 1840s in the USA, when Horace Mann first exhorted local governments to appropriate funds for building school libraries and for public education broadly speaking, to the formation of associations of school libraries nationally and internationally, librarians' collective presence has been steadily solidified by acknowledging our shared histories. Librarians working with children in the last half-century increasingly strive to integrate new technologies with traditional book-related activities, provide a "third space" for children with after-school programs and homework assistance, and assist patrons in gaining access to information necessary to complete reference inquiries (Walter, 2004). Communication among school librarians also informs the implementation of new technologies, tools, and resource spaces and this collective knowledge is a rich and continuing resource (Gerhardt, 2004; Miller, 1979).

The current designs found within school libraries reflect an openness and receptivity to scholarly exchange comparable to the activities which occurred in the agora and fora of the classical world. The world of ancient Greece was markedly different than that of our 21st century, not least in that the Stoic philosophical tradition held students to observing and analyzing only their most immediate worldview (Yngve, 1981). The scientific revolution expanded the use of critical inquiry in schools, and globalization continues to affect students' contextual understanding of differing cultural experiences.

In collaborating with school leaders and teachers to implement technology-based learning in a research commons, librarians can draw from historical practices in library design to maximize the effectiveness of their learning spaces. Reflecting on current practices can benefit librarians by employing their ingenuity and command of "information" to meet students' needs, just as the Greeks' use of philosophy sought to answer their most pressing questions (Wright, 1976). The opening of shared learning spaces, permitting many people and ideas to gather and communicate, enables this reflective practice. Connections made between our current school libraries and media centers and literacy practices and those extending back several millennia can enrich and inform design decisions made to support student learning.

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