

Imagining the Use of Intelligent Agents and Artificial Intelligence in Academic Law Libraries*

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Academic law librarians should consider ways to incorporate intelligent technology into their libraries in order to benefit the law school community. This article explains the distinction between intelligent agents and artificial intelligence, discusses current and potential future uses for both, provides examples of how academic law librarians can use them, and explores their benefits and drawbacks. Finally, it examines issues unique to law libraries, including how the ABA standards could affect the use of these technologies.

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Introduction

¶1 A common image of artificial intelligence is a robot that thinks like a human and interacts seamlessly with people, understanding their needs and learning from previous interactions. Artificial intelligence has aptly been described as a “digital sister-in-law”:

When I want to go out to the movies, rather than read reviews, I ask my sister-in-law. We all have an equivalent who is both an expert on movies and an expert on us. What we need to build is a digital sister-in-law.¹

¶2 While this model of artificial intelligence does not currently exist, agent technology, a subfield of artificial intelligence, has been used in a variety of settings.² Many scholars define “agent technology” as “a software entity which functions continuously and autonomously in a particular environment, often inhibited by other agents and processes.”³ This definition of “agent technology” includes intelligent agents that can make “decisions about how [they] act[] based on experience” and are “free to choose between different actions.”⁴ Agent technology has been used in connection with online shopping to assist in product search and selection.⁵ Agents have also assisted digital library patrons with locating materials and streamlining the search process.⁶ Additionally, a limited number of academic and public libraries have explored the use of agents in connection with reference and information literacy instruction.⁷ Undergraduate education has also successfully experimented with the use of agents in connection with teaching.⁸

1. Jeffrey M. Bradshaw, *An Introduction to Software Agents*, in *SOFTWARE AGENTS* 6 (Jeffrey M. Bradshaw ed., 1997) (quoting Nicholas Negroponte); see also Amy Baylor, *Intelligent Agents as Cognitive Tools for Education*, 39 *EDUC. TECH.* 36 (1999); Ali Jafari, *Conceptualizing Intelligent Agents for Teaching and Learning*, 25 *EDUCAUSE Q.*, no. 3, 2002, at 28, 29.

2. See Valeda F. Dent, *Intelligent Agent Concepts in the Modern Library*, 25 *LIBR. HI TECH* 108, 109 (2007); Brian Detlor & Clement Arsenault, *Web Information Seeking and Retrieval in Digital Library Contexts: Towards an Intelligent Agent Solution*, 26 *ONLINE INFO. REV.* 404 (2002) (referring to the use of agents in e-commerce, including “industrial, commercial, medical, and entertainment applications”).

3. Dent, *supra* note 2, at 109 (quoting Yoav Shoham).

4. Frederick Mills & Robert Stufflebeam, *Introduction to Intelligent Agents*, CCSI, http://www.mind.ilstu.edu/curriculum/ants_nasa/intelligent_agents.php [<https://perma.cc/G2CZ-8USD>].

5. See Dent, *supra* note 2 at 112.

6. See Laurie Crum, *University of Michigan Digital Library Project*, 38 *COMM. OF THE ACM* 63 (1995); Detlor & Arsenault, *supra* note 2, at 404–05; J. Alfredo Sánchez et al., *Distributed Information Retrieval from Web-Accessible Digital Libraries Using Mobile Agents*, 3 *UPGRADE* 37, 37–38 (2002); William P. Birmingham et al., *The University of Michigan Digital Library: This Is Not Your Father’s Library*, <http://www.cSDL.tamu.edu/DL94/paper/umdl.html> [<https://perma.cc/W8ED-2SXG>]; Norbert Fuhr, Norbert Gövert & Claus-Peter Klas, *An Agent-Based Architecture for Supporting High-Level Search Activities in Federated Digital Libraries* (2000), http://www.is.informatik.uni-duisburg.de/bib/docs/Fuhr_et_al_00.html.en [<https://perma.cc/Z9ZL-7R59>].

7. See Dent, *supra* note 2, at 119–21; Michele McNeal & David Newyear, *Chatbots: Automating Reference in Public Libraries*, in *ROBOTS IN ACADEMIC LIBRARIES: ADVANCEMENTS IN LIBRARY AUTOMATION* 101 (Edward Iglesias ed., 2013); Ma. Auxilio Medina, J. Alberto Chávez & Antonio Benítez, *Inclusion of Reference Agents in a Virtual Reference Environment*, 2003 *PROC. OF THE 4TH MEX. INT’L CONF. ON COMPUTER SCI.* 246; Victoria L. Rubin, Yimin Chen & Lynne Marie Thorimbert, *Artificially Intelligent Conversational Agents in Libraries*, 28 *LIBR. HI TECH.* 496, 513 (2010).

8. Baylor, *supra* note 1, at 36; Jafari, *supra* note 1, at 28; Yi Shang, Hongchi Shi & Su-Shing Chen, *An Intelligent Distributed Environment for Active Learning*, 1 *J. EDUC. RESOURCES COMPUTING* 1 (2001).

¶3 More than a decade ago, Roy Balleste, an academic law librarian and the current director of the law library at St. Thomas University School of Law, first introduced the concept of intelligent agent technology to academic law libraries through a virtual library assistant named Page.⁹ Balleste's writings have also identified possible future uses for artificial intelligence in circulation, cataloging, distance education, and reference.¹⁰ The time is right to revisit the current uses of agent technology and the future possibilities for more sophisticated artificial intelligence in academic law libraries in light of technological advancements, the successful integration of agent systems in libraries and educational settings, changes in legal education, and an increasingly technologically savvy student body.

¶4 While artificial intelligence and intelligent agents are intriguing concepts, the question remains whether academic law librarians should consider using them with the ever-changing legal environment and budgetary constraints that plague many of our libraries. In a profession where librarians' contributions to legal education are often undervalued,¹¹ librarians must consider new ways to incorporate technology that may help improve the quality of library services. Artificial intelligence and agent technology should not replace librarians, however, as librarians are vital to the existence of libraries. Academic law librarians are highly educated and skilled multitaskers who are often pulled in many different directions yet strive to provide the highest level of service to the entire law school community. Law librarians provide reference services, instruct patrons on the use of library resources, teach law students in a variety of settings, and conduct research for faculty members as well as for their own academic endeavors. While patrons continue to interact face-to-face with reference librarians, many questions do not require a librarian's expertise.¹² Integrating agent technology (and more sophisticated artificial intelligence in the future) into academic law libraries is a meaningful way to complement librarians' work and alleviate some of the burdens placed on librarians¹³ that will allow them to focus on more complex and time-consuming obligations. Rubin, Chen, and Thorimbert, library scholars, assert:

9. Roy Balleste, *The Future of Artificial Intelligence in Your Virtual Libraries*, COMPUTERS IN LIBR., Oct. 2002, at 10; Roy Balleste, UNIV. OF ST. THOMAS SCH. OF LAW, <http://www.stu.edu/law/faculty-staff/faculty/roy-balleste> [https://perma.cc/9SPG-DEL3].

10. Roy Balleste, *A Hypothetical Case Study: Creating AI Assistants in the Law Library*, 26 LEGAL REFERENCE SERVS. Q. 47, 54 (2007) [hereinafter Balleste, *Hypothetical Case Study*]; Roy Balleste, *Technology Trends in Law Libraries*, in LAW LIBRARIANSHIP IN THE TWENTY-FIRST CENTURY 147, 155 (Roy Balleste, Sonia Luna-Lamas & Lisa Smith-Butler eds., 2007); Balleste, *supra* note 9, at 12–13 (Balleste touches on these subjects but does not provide specific examples of how patrons would interact with these technologies, nor does he discuss the use of intelligent technology in information literacy instruction).

11. Genevieve Blake Tung, *Academic Law Libraries and the Crisis in Legal Education*, 105 LAW LIBR. J. 275, 278, 2013 LAW LIBR. J. 14, ¶ 7.

12. Bradley Wade Bishop & Jennifer A. Bartlett, *Where Do We Go from Here? Informing Academic Library Staffing Through Reference Transaction Analysis*, 74 C. & RES. LIBR. 489, 494 (2013).

13. Detlor & Arsenaault, *supra* note 2, at 407–08 (“[A] major benefit of an agent-based environment would be its relief of reference librarians from trying to service personal information requests for a large number of clients. This is more important nowadays given the budgetary and time constraints facing library institutions attempting to offer individualised service, and the demands of an ever-growing technology-savvy client base who want information needs satisfied in short turn-around times.”).

[A]t times when librarians are not available or are out of patrons' reach, [forms of artificial intelligence]. . . could step into specific roles, such as automated virtual reference librarians, web site tour guides, reader's advisory service providers, and conversational or book club hosts. Just like nurses that can perform basic diagnostics prior to the physician's examination, conversational agents could take care entirely of "the tedious and repetitive" tasks, and potentially triage patrons to a superior authority, a live human expert: the librarian.¹⁴

Additionally, academic law librarians may be missing the opportunity to assist patrons who are less comfortable with in-person reference and would prefer to use computers equipped with artificial intelligence to answer their questions.¹⁵ Librarians should be involved in the development of intelligent technology and the direction it will take in the future to help ensure that the technology is used in ways that meet librarians' goals and objectives.¹⁶

¶5 This article focuses on the current uses of agent technology and suggests some potential future uses of more sophisticated artificial intelligence in academic law libraries. For a discussion of the technical aspects of artificial intelligence, readers may explore the many textbooks and articles on these topics.¹⁷ In considering the premise of this article, readers are encouraged to resist the impulse to say "that can never happen" or "that will never work, at least not at my library," because artificial intelligence can improve the library services provided to faculty, students, local bar members, and unrepresented litigants who frequent academic law libraries.

Artificial Intelligence and Intelligent Agent Technology

What Are Artificial Intelligence and Intelligent Agents?

¶6 Artificial intelligence is a science that is a "truly universal field."¹⁸ Experts in the field debate what exactly constitutes artificial intelligence. In fact, scholars have advanced at least eight definitions of the term "artificial intelligence."¹⁹ These definitions of "artificial intelligence" vary widely; some definitions focus on human thought process and thinking while others address human behavior.²⁰ Still other definitions of the term emphasize thinking or acting rationally as the ideal concept of intelligence.²¹ Preeminent scholars in the field believe that artificial intelligence

14. Rubin, Chen & Thorimbert, *supra* note 7, at 513.

15. McNeal & Newyear, *supra* note 7, at 107 (For patrons "who are shy or uncomfortable making face to face information requests, chatbots provide a private, nonthreatening, nonjudgmental interface where they can seek the information they need.").

16. *Id.* at 111–12 ("What happens if we ignore this technology? If we don't embrace and attempt to direct this technology and its implementation, we are likely to have it thrust upon us in ways we cannot direct, either by library boards or administrations whose bottom line is the dollar cost per question answered. If we use Virtual Agents to enhance and streamline our information services. . . we can reap the benefits of this technology and, at the same time, position our professional librarians to provide those value-added services to our users of which they alone can excel.").

17. See, e.g., STUART RUSSELL & PETER NORVIG, *ARTIFICIAL INTELLIGENCE: A MODERN APPROACH* (2d ed. 2003); Sophie-Julie Pelletier, Samuel Pierre & Hai Hoc Hoang, *Modeling a Multi-Agent System for Retrieving Information from Distributed Sources*, 11 J. COMPUTING & INFO. TECH. 15 (2003); Sánchez et al., *supra* note 6.

18. RUSSELL & NORVIG, *supra* note 17, at 1.

19. *Id.*

20. *Id.*

21. *Id.*

systems that act rationally are preferred.²² Over the years, scholars have considered all computer systems that satisfy any of these definitions to constitute artificial intelligence.²³ Hence, the field of artificial intelligence is extremely broad. Artificial intelligence encompasses both concepts of human intellectual activity as well as specific tasks, including solving mathematical theorems and playing chess.²⁴ The literature describes artificial intelligence as everything from relatively simple computer programs and conversational agents to sophisticated robots.²⁵ To be considered artificial intelligence, however, a computer system or robot must meet certain benchmarks: it must (1) communicate using natural language, (2) store information, (3) engage in automated reasoning (i.e., logic) to evaluate stored information to answer inquiries, (4) adapt to new situations and extrapolate patterns, (5) contain computer vision, and (6) include robotics functions.²⁶

¶7 The technology driving artificial intelligence has not been developed to the point where robots or computer systems are capable of thinking cognitively like human beings. Currently, many intelligent computer systems function by using computer programs²⁷ called intelligent agents that actually carry out and achieve the specific outcome.²⁸ An intelligent agent is essentially the workhorse of intelligent technology.²⁹ These agent-based computer systems most often act “to achieve the best outcome or, when there is uncertainty, the best expected outcome.”³⁰ These systems attempt to predict the correct or best result based on the precepts (rules) that they receive and any prior knowledge of the environment in which they operate.³¹

¶8 In the library context, scholars and librarians have been known to use the terms “intelligent agent,” “conversational agent,” and “artificial intelligence”

22. *Id.* at 4–5; Guoying Liu, *The Application of Intelligent Agents in Libraries: A Survey*, 45 ELECTRONIC LIBR. & INFO. SYS. 78, 80 (2011) (stating that Russell and Norvig’s “book is widely adopted as the textbook by many undergraduate and graduate computer science and engineering courses around the world.”).

23. See RUSSELL & NORVIG, *supra* note 17, at 2.

24. *Id.* at 1.

25. See Bradshaw, *supra* note 1, at 6; Dent, *supra* note 2, at 109; Rubin, Chen & Thorimbert, *supra* note 7, at 496–97; Carina Kolodny, *Stephen Hawking Is Terrified of Artificial Intelligence*, HUFFINGTON POST (May 5, 2014 1:52 PM), http://www.huffingtonpost.com/2014/05/05/stephen-hawking-artificial-intelligence_n_5267481.html [<https://perma.cc/5WW-3L9E>].

26. See RUSSELL & NORVIG, *supra* note 17, at 2–3 (“These six disciplines compose most of AI . . .”); *Automated Reasoning*, STANFORD ENCYCLOPEDIA OF PHILOSOPHY (rev. Nov. 20, 2014), <http://plato.stanford.edu/entries/reasoning-automated/> [<https://perma.cc/F9B9-FBN5>].

27. RUSSELL & NORVIG, *supra* note 17, at 4 (“But computer agents are expected to have other attributes that distinguish them from mere ‘programs,’ such as operating under autonomous control, perceiving their environment, persisting over a prolonged time period, adapting to change, and being capable of taking on another’s goals.”).

28. See *id.* at 4, 32–33.

29. Minoos Lohani & V.K.J. Jeevan, *Intelligent Software Agents for Library Applications*, 28 LIBR. MGMT. 139, 141 (2007) (“[A]n agent is software that lets the user define what is instantly or eventually wanted, and works towards that goal, without the user having to worry about anything else than waiting [for] the results of the agent’s work.”).

30. RUSSELL & NORVIG, *supra* note 17, at 4.

31. See *id.* at 4, 36 (“For each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.” *Id.* at 36.).

interchangeably.³² In reality, however, many of the current systems seen in libraries are actually agent systems that use components of artificial intelligence, namely automated reasoning or logical searching, to assist library patrons.³³ Additionally, a limited number of academic and public libraries have proposed or developed conversational agents called chatbots that use natural language processing.³⁴ It is possible to imagine that these agent systems will develop beyond the current technology toward more sophisticated artificial intelligence in the future. Thus, some of the hypotheticals discussed in this article are futuristic in nature, allowing readers to envision how artificial intelligence in the future can provide increasingly important functions in academic law libraries, including engaging with patrons in circulation, fielding reference questions, increasing access to information, and information literacy instruction.³⁵

¶9 Intelligent agent systems and conversational agents can be developed in-house or by vendors. One company, Pandorabots, Inc., has developed fully customizable virtual chatbot assistants specifically for libraries.³⁶ These virtual assistants are able to answer simple inquiries about topics including library hours, the location of materials, and upcoming library events.³⁷ Pandorabots adheres to open source standards when possible, includes various hosting options, and provides an assessment about a library's needs.³⁸ In the future, Pandorabots intends to expand its functionality by providing "products that deploy interactive, measurable messages into mobile platforms, micro-blogging platforms, Instant Messaging platforms, internet, branded entertainment and custom solutions."³⁹ Another company, SitePal, allows customers to purchase and embed avatars into websites.⁴⁰ These products allow library patrons to interact with the library and its resources in unique and meaningful ways.

32. See McNeal & Newyear, *supra* note 7, at 102; Michele L. McNeal & David Newyear, *Introducing Chatbots in Libraries*, 49 LIBR. TECH. REP., Nov./Dec. 2013, at 5, 5–6; Rubin, Chen & Thorimbert, *supra* note 7, at 497.

33. See Dent, *supra* note 2, at 109–21; Detlor & Arsenault, *supra* note 2, at 405–06; Fuhr, Gövert & Klas, *supra* note 6, at 3–7; Pelletier, Pierre & Hoang, *supra* note 17, at 19–20; Sánchez et al., *supra* note 6, at 39–42.

34. See ABDUL AHAD, NEVA: A CONVERSATIONAL AGENT BASED INTERFACE FOR LIBRARY INFORMATION SYSTEMS 6 (2005); Rubin, Chen, & Thorimbert, *supra* note 7, at 497.

35. See Laura Zick, *The Work of Information Mediators: A Comparison of Librarians and Intelligent Software Agents*, 5 FIRST MONDAY (May 2000), <http://pear.acc.uic.edu/ojs/index.php/fm/article/view/748/657> [<https://perma.cc/LV4B-9H4U>] (providing examples of software agents in connection with reference, serials processing, interlibrary loan processing, acquisitions, circulation, and digital libraries); see also Balleste, *Hypothetical Case Study*, *supra* note 10, at 54; Dent, *supra* note 2, at 121; Jafari, *supra* note 1, at 29–34.

36. *Cybersphinx for Libraries—A Virtual Assistant Librarian for Libraries*, PANDORABOTS, <http://pandorabots.com/static/html/PremiumServices/SoftwareSolutions/LibraryPandorabot/LandingPage.html> (last updated Feb. 15, 2014) [<https://perma.cc/K3U6-L4UH>] [hereinafter *Cybersphinx*]. Other companies providing virtual agent technology include Artificial Solutions (<http://www.artificial-solutions.com>) and BMC (<http://www.bmc.com/it-solutions/remedy-virtual-agent.html>).

37. *Cybersphinx*, *supra* note 36.

38. *Cybersphinx—The Cybrarian's and Librarian's Assistant—The Details*, PANDORABOTS, <http://pandorabots.com/static/html/PremiumServices/SoftwareSolutions/LibraryPandorabot/librarydetails.html> (last updated Feb. 15, 2014) [<https://perma.cc/94Y2-W2P4>].

39. *Id.*

40. *About Us*, SITEPAL, <http://www.sitepal.com/aboutus/> [<https://perma.cc/93QX-Z5T7>].

Recent Developments in Artificial Intelligence

¶10 Researchers have continued to improve the functionality of artificial intelligence. Beginning in the mid-1990s, artificial intelligence researchers began to design intelligent agents to function within the Internet, allowing people to navigate this new environment.⁴¹ Natural language technology also continues to develop, as evidenced by Apple iPhone's Siri.⁴² Self-driving cars and Google Now, a computer software application that serves as a personal assistant, show the incredible developments in intelligent technology that may revolutionize many people's lives.⁴³ Projects such as Google Brain, a deep-learning research project, and Carnegie Mellon's NEIL, a computer program that makes commonsense assumptions using a database of images, have also advanced the field of artificial intelligence.⁴⁴ Companies like Google are serious about developing artificial intelligence, spending millions of dollars on research. Google recently purchased DeepMind Technologies, a company focused on artificial intelligence research, for \$650 million, and Boston Dynamics, a robotics company, for an undisclosed amount.⁴⁵

¶11 Experts remain uncertain about when artificial intelligence will reach its full potential and cognitively think like human beings. With all of the money being spent on artificial intelligence research, it is possible that someone will develop an algorithm for it tomorrow.⁴⁶ However, optimists predict that it will take 5 to 80 years for artificial intelligence to cognitively think.⁴⁷ On the other hand, skeptics believe that it may take 200 to 400 years to develop artificial intelligence to its full capability.⁴⁸ While scholars disagree about how close we are to realizing fully functioning artificial intelligence, one thing appears to be certain: it is here to stay.⁴⁹

How Intelligent Agents Have Been Used in Libraries and Other Academic Settings

¶12 Academic law librarians can identify ways to use intelligent technology to improve patron services by studying how other types of libraries and academic

41. See RUSSELL & NORVIG, *supra* note 17, at 27.

42. See Liat Clark, *Falling in Love with AI Virtual Assistants: A Creepy Love Affair Nearer than You Think*, WIRED (Dec. 9, 2013), <http://www.wired.co.uk/news/archive/2013-12/09/virtual-assistant-ai-love> [https://perma.cc/587X-5M4E].

43. Kolodny, *supra* note 25; Stephen Hawking, "Transcendence Looks at the Implications of Artificial Intelligence—But Are We Taking AI Seriously Enough?," INDEPENDENT (May 1, 2014), <http://www.independent.co.uk/news/science/stephen-hawking-transcendence-looks-at-the-implications-of-artificial-intelligence--but-are-we-taking-ai-seriously-enough-9313474.html> [https://perma.cc/K582-M4UJ] [hereinafter *Stephen Hawking*].

44. Press Release, Carnegie Mellon Univ., Carnegie Mellon Computer Searches Web 24/7 to Analyze Images and Teach Itself Common Sense (Nov. 20, 2013), http://www.cmu.edu/news/stories/archives/2013/november/nov20_webcommonsense.html [https://perma.cc/5PKF-ZLR4]; Robert McMillan, *Inside the Artificial Brain That's Remaking the Google Empire*, WIRED (July 16, 2014, 6:30 AM), http://www.wired.com/2014/07/google_brain/ [https://perma.cc/RNP6-N3D4].

45. Kolodny, *supra* note 25.

46. See Mark Piesing, *Predicting the Future of Artificial Intelligence Has Always Been a Fool's Game*, WIRED (Mar. 30, 2013), <http://www.wired.co.uk/news/archive/2013-03/29/predicting-artificial-intelligence> [https://perma.cc/2JCT-YTMF].

47. *Id.*

48. *Id.*

49. Dent, *supra* note 2, at 109.

disciplines, namely education, have successfully adopted this technology.⁵⁰ Examples from undergraduate education, public libraries, and academic libraries where agent technology has been successfully integrated into teaching, reference, and circulation can show us how to use this technology to improve services to the entire law school community.

Undergraduate Education

¶13 Undergraduate students have responded positively to the use of agents in learning environments.⁵¹ In fact, students become emotionally connected to agents, “facilitating their enjoyment of the learning situation.”⁵² Evidence suggests that the use of agents also helps improve student engagement.⁵³ Using agent technology as digital tutors allows instructors to depart from lectures as the primary teaching method and tailor lessons to how students learn best—as active participants in the learning experience.⁵⁴ Learning is more likely to occur when agents are used to “support, guide, and extend the thinking processes” of students and the agents’ actions are transparent to the students.⁵⁵ Agents should also adapt to students’ performances and anticipate students’ mistakes, suggesting correct alternatives.⁵⁶ All forms of instruction, including the use of agent technology as a teaching tool, must actively engage students in the learning process, as they learn by doing.⁵⁷

¶14 One example of an agent-based digital tutor system used in undergraduate education is IDEAL (Intelligent Distributed Environment for Active Learning), which was designed with the goal of encouraging students to become active participants in the learning process.⁵⁸ IDEAL is a “student-centered, self-paced, and highly interactive” web-based asynchronous learning environment.⁵⁹ IDEAL maximizes the opportunities for learning by providing extensive course content and twenty-four-hour access to materials.⁶⁰ “IDEAL provides an interactive learning environment that combines the visual presentation of course information, class notes,” and customized learning exercises.⁶¹ Agents working within IDEAL use information about each student’s background, learning style, interests, and other

50. See Paul D. Callister, *Time to Blossom: An Inquiry into Bloom’s Taxonomy as a Hierarchy and Means for Teaching Legal Research Skills*, 102 LAW LIBR. J. 191, 193, 2010 LAW LIBR. J. 12, ¶ 5.

51. Amy L. Baylor, *Expanding Preservice Teachers’ Metacognitive Awareness of Instructional Planning Through Pedagogical Agents*, 50 EDUC. TECH. RES. & DEV., no. 2, 2002, at 5; Jafari, *supra* note 1, at 30.

52. Sagarjit Roy, Sanghamitra Das & Paramita Malla, *Identifying Learner’s Compatibility to Enhanced e-Learning Contents Using Agent*, 27 INT’L J. COMPUTER APPLICATIONS, no. 5, 2001, at 31.

53. Rubin, Chen & Thorimbert, *supra* note 7, at 506 (“One scholar found] that the increased level of control and feedback afforded by the chatbot interactions significantly improved the accuracy of students’ self-assessment abilities as compared to students using the same software minus the conversational agent. Incorporating chatbots helps improve student engagement, increase interactivity, and keep students on task.”); see also Baylor, *supra* note 1 at 38–39; Jafari, *supra* note 1, at 29.

54. Shang, Shi & Chen, *supra* note 8, at 1.

55. Baylor, *supra* note 1, at 37; Amy Baylor, *Permutations of Control: Cognitive Considerations for Agent-Based Learning Environments*, 12 J. INTERACTIVE LEARNING RES. 403, 407 (2001).

56. See Baylor, *supra* note 1, at 37.

57. Shang, Shi & Chen, *supra* note 8, at 2.

58. *Id.* at 3.

59. *Id.* at 4.

60. *Id.*

61. *Id.* at 12.

courses to act as a digital tutor.⁶² The digital tutor “creates exercises and questions according to the student’s background and learning status, provides solutions, and explains the concepts and solutions to remedy student’s misconceptions.”⁶³ Through these customized exercises, students become active participants in the learning experience, and the teacher acts as “coach, expert guide, and role model.”⁶⁴ IDEAL also assesses each student’s performance by calculating a “learned score,” which tracks how extensively the student has studied the online course materials and the number of times the student has reviewed each topic.⁶⁵ This type of information allows instructors to monitor student performance and help determine the effectiveness of course materials.

¶15 Digital tutors using agent technology have also been used in medical and dental schools where students interact with virtual patients in simulated clinical scenarios.⁶⁶ This type of training allows students to learn without the consequences of making errors on human patients.⁶⁷ The agents provide feedback to the students and suggest reference materials to help them learn.⁶⁸ The agents can also monitor and manage course activities and notify professors when students’ assignments are overdue, participation is lacking, or online quizzes are incomplete.⁶⁹ Law students may benefit from the use of intelligent agents as digital tutors in terms of increased student involvement and an increased connection to the learning experience, which may ultimately foster student learning.

Digital Libraries

¶16 The use of agent technology in libraries began in digital libraries.⁷⁰ Examples include the use of agents to assist with searching for and retrieving information across digital library collections and helping with query formation, similar to the advanced Google search feature.⁷¹ One of the first digital library projects to incorporate agents was the University of Michigan Digital Library Project.⁷² This project created a digital library in which agents help patrons locate information across several libraries.⁷³ The goal of the University of Michigan Digital Library Project was to prevent information overload by designing agents that retrieve only relevant search results based on the user’s search query.⁷⁴

62. *Id.* at 5.

63. *Id.*

64. *Id.* at 6.

65. *Id.* at 10.

66. Rubin, Chen & Thorimbert, *supra* note 7, at 505–06; *Advanced Distance Education (ADE)*, www.isi.edu/isd/ADE/ade.html [<https://perma.cc/PLM3-WJRX>].

67. Rubin, Chen & Thorimbert, *supra* note 7, at 506.

68. *Id.* at 505–06.

69. Jafari, *supra* note 1, at 29.

70. Crum, *supra* note 6, at 64.

71. See Valeda Frances Dent et al., *Agent Technology Concepts in a Heterogeneous Distributed Searching Environment*, 31 VINE 55, 58 (2001); Detlor & Arsenault, *supra* note 2, at 404, 406; Fuhr, Govert & Klas, *supra* note 6, at 1, 3; Pelletier, Pierre & Hoang, *supra* note 17, at 15–17; Sánchez et al., *supra* note 6, at 37; André Schaefer et al., *Active Support for Query Formation in Virtual Digital Libraries: A Case Study with DAFFODIL* (2005), at [1], http://www.is.informatik.uni-duisburg.de/bib/docs/Schaefer_etal_05.html.en [<https://perma.cc/KS4G-5D5E>].

72. See Crum, *supra* note 6, at 63–64.

73. See *id.*

74. See Birmingham et al., *supra* note 6.

¶17 A digital library at a university in Mexico has also explored the use of agent technology in connection with reference. An agent-based virtual reference system, referred to as Vref, allows library patrons to inquire about how to locate information from the university's digital library.⁷⁵ To answer the patron's inquiry, Vref extracts keywords from the patron's query.⁷⁶ Vref can access the World Wide Web and also rely on the results from previous reference transactions to answer patron inquiries.⁷⁷ Once Vref finds and filters the search results, it suggests relevant information and sources.⁷⁸

Public and Academic Libraries

¶18 A relatively small number of academic and public libraries have experimented with or proposed the use of agents to streamline circulation, assist with reference, and enhance teaching. The librarians at Mentor Public Library in Ohio introduced Emma, a chatbot, to patrons in 2009, who reacted positively to this new technology.⁷⁹ Emma was developed initially using SitePal and later migrated to Pandorabot.⁸⁰ Initially, Emma was programmed to answer 12 frequently asked questions.⁸¹ By 2010, Emma was answering approximately 300 questions each week.⁸² However, Emma's ability to accurately answer questions was a concern for the librarians.⁸³ For that reason, the librarians reprogrammed her to ask questions to patrons to determine whether their inquiries related to materials within the library or elsewhere.⁸⁴ For inquiries that did not relate directly to cataloged items, Emma extracted keywords to find appropriate resources to meet patrons' needs.⁸⁵ In 2011, patrons had 7116 conversations with Emma, and by the end of 2011, Emma's accuracy had improved to approximately ninety percent.⁸⁶ While some of the library staff embraced Emma's ability to answer directional-type questions, other staff members raised concerns about Emma.⁸⁷ Namely, these staff members questioned whether Emma would eliminate their jobs and adequately perform customer service functions.⁸⁸ In 2011, Emma was renamed InfoTabby.⁸⁹

¶19 The librarians at Hunter College have used agents to create a research module to assist with information literacy instruction.⁹⁰ The agents guide students through a variety of library services and help them with the research process,

75. Medina, Chávez & Benítez, *supra* note 7, at 1.

76. *Id.* at 3.

77. *See id.*

78. *Id.*

79. McNeal & Newyear, *supra* note 7, at 101, 104 (suggesting that patrons' positive responses were due to their ability to elect to interact with Emma).

80. *Id.* at 102.

81. *Id.*

82. *Id.*

83. *Id.*

84. *Id.* at 103.

85. *Id.*

86. *Id.*

87. *Id.* at 104.

88. *Id.*

89. *See* McNeal & Newyear, *supra* note 32, at 9. McNeal and Newyear indicate that InfoTabby is currently operating on the Mentor Public Library website. However, I was unable to locate InfoTabby when I visited the library's website (<http://www.mentorpl.org>).

90. Dent, *supra* note 2, at 119–21.

including providing on-demand information literacy instruction, assisting with interlibrary loans, and locating electronic course reserves.⁹¹ The Hunter College model can be expanded to assist students by suggesting keywords for more accurate searches, providing on-demand instruction for students who encounter problems with search inquiries, proposing effective search strategies, and pairing students with similar research interests.⁹²

¶20 Librarians from several large public libraries in Canada have advocated for the use of conversational agents to supplement the interaction that patrons have with librarians.⁹³ Conversational agents have “human-computer interfaces designed to simulate conversation with a real person, are an effective, appropriate complement to many existing library services and may be the key to unlocking solutions to future interactions with information.”⁹⁴ These conversational agents can provide reference and circulation assistance to patrons by answering simple reference questions, directing patrons to locations within the library, assisting patrons with library or other website addresses, locating online public access catalog records, renewing materials, and requesting interlibrary loans.⁹⁵

¶21 Agent technology has also been used to streamline circulation services through the use of radio frequency identification (RFID) tags that track the use and location of library materials.⁹⁶ This type of technology has been found to reduce the time library staff spends tracking inventory and check-in and -out procedures.⁹⁷

Academic Law Libraries

¶22 As noted earlier, Roy Balleste was the first to propose the use of intelligent technology in academic law libraries.⁹⁸ He argued that this type of technology could extend library hours, answer simple questions about the library, guide patrons on the use of the catalog, assist with distance education, and streamline cataloging and circulation operations.⁹⁹ In 2002, Balleste discussed the launch of Page, a chatbot, at Nova Southeastern University Law Library.¹⁰⁰ Patrons accessed Page through the library’s website.¹⁰¹ Page served as a guide to the library’s resources and enhanced customer service.¹⁰² However, in 2007, Balleste acknowledged the limitations of artificial intelligence:

These complex capabilities are still far from reality. Yet, the potential for this technology is fascinating. . . . We can only hypothesize about the future, yet there is plenty of evidence to suggest that artificial intelligence, as a trend, will continue to be explored and developed.¹⁰³

91. *Id.* at 119.

92. *See id.* at 121.

93. Rubin, Chen & Thorimbert, *supra* note 7, at 497.

94. *Id.* at 497.

95. *Id.* at 508.

96. Toshiro Minami, *Needs and Benefits of Massively Multi Book Agent Systems for u-Libraries*, in *MASSIVELY MULTI-AGENT SYSTEMS* 239 (2005).

97. *Id.*

98. *See* Balleste, *supra* note 9, at 10.

99. Balleste, *Hypothetical Case Study*, *supra* note 10, at 54; Balleste, *supra* note 9, at 12–13.

100. Balleste, *supra* note 9, at 10.

101. *Id.*

102. *Id.*

103. Balleste, *Hypothetical Case Study*, *supra* note 10, at 54.

In light of advances in agent technology, an increased acceptance for distance education by the legal community, and concrete examples of how this technology has been successfully applied, it is now time to revisit and expand on Balleste's ideas about the uses of agent technology and artificial intelligence in academic law libraries.

How Should Intelligent Agents and Artificial Intelligence Be Used in Academic Law Libraries?

¶23 Academic law libraries should incorporate relevant aspects of the examples discussed above to enhance library services and help improve students' information literacy skills.

Reference

¶24 Agent technology can help provide more effective reference services to academic law library patrons now and in the future as artificially intelligent technology continues to develop. Many reference questions do not require a reference librarian's expertise. A recent study from the University of Kentucky found that roughly seventy percent of face-to-face reference interactions at the university's law library were location-based inquiries.¹⁰⁴ These questions related to the availability of resources, printing, circulation assistance, desk supplies, and computer problems.¹⁰⁵ Approximately fifteen percent of the reference questions asked face-to-face of law librarians required their expertise.¹⁰⁶

¶25 With evidence suggesting that such a small percentage of reference questions actually require librarian assistance, the question remains whether academic law libraries should eliminate the traditional reference desk. Rather than forgo the reference desk, a better solution is to incorporate agent technology into academic law libraries so that librarians, along with intelligent reference assistants, answer patrons' reference questions efficiently and effectively. While the University of Kentucky study found that a large percentage of students engaged face-to-face with librarians, other evidence suggests that students are willing to use technology to determine a library's hours of operation and availability of materials.¹⁰⁷ Answers to these directional questions should be provided by conversational agents that are embedded within a library's website and accessible through computers, tablets, or smartphones. Librarians can then focus their attention on the percentage of reference questions that require their expertise and other important duties, including teaching and involvement in clinics or directed research.¹⁰⁸

104. See Bishop & Bartlett, *supra* note 12, at 495. The study also found that sixty-six percent of reference questions asked at all of the university's libraries were related to the location of study rooms, classes, bathrooms, and printing. Eighty percent of these directional questions were asked face-to-face to reference librarians.

105. *Id.* at 494.

106. *Id.* at 495.

107. *Id.*; Jin Wu et al., *Measuring Patrons' Technology Habits: An Evidence-Based Approach to Tailoring Library Services*, 102 J. MED. LIBR. ASS'N 125, 127 (2014) ("[T]here is significant interest in using devices to communicate with the library to obtain information about hours, availability of materials, due dates, and interest in accessing materials licensed by the library, such as e-books and apps.").

108. See Bishop & Bartlett, *supra* note 12, at 495; Vicenç Feliú & Helen Frazer, *Embedded Librarians: Teaching Legal Research as a Lawyering Skill*, 61 J. LEGAL EDUC. 540, 542 (2012); Ann

¶26 In the future, it is possible that intelligent reference assistants may be able to answer directional questions, as well as more sophisticated questions. If an intelligent reference assistant is unable to adequately answer a reference question, it should be able to refer patrons directly to librarians, identifying librarians based on their availability and expertise.¹⁰⁹ Perhaps these intelligent reference assistants will be able to access the librarians' calendars or contact them directly in their offices, giving librarians information about the patrons, the inquiries, and resources already considered. Below is a hypothetical interaction between an intelligent reference assistant (Martha) and a librarian:

Librarian: Yes, Martha. How can I help you?

Martha: I've been assisting a student patron who is looking for information about a proposed regulation in the Federal Register. I conducted a Google search and found the proposed regulation, but I haven't been able to find much else.

Librarian: Do you know exactly what proposed regulation the patron is looking for?

Martha: Yes, a proposed regulation relating to the airworthiness of certain airplanes.

Librarian: OK, did you look at any government agency websites or the Federal Register?

Martha: I looked at the Federal Aviation Administration website first and then the electronic version of the Federal Register, but the patron still has some questions.

Librarian: Did you conduct a search on Westlaw or Lexis for law reviews or newspaper articles?

Martha: Yes, and I have referred the patron to a couple of citations to articles.

Librarian: OK, good. I will connect with the patron through the library's website to discuss the proposed regulation and the regulatory process in more detail. Thank you, Martha.

Martha: Thank you.¹¹⁰

This example of a more complex and futuristic reference interaction highlights how artificial intelligence may be able to conduct basic searches while deferring to reference librarians for more sophisticated questions that require their expertise. While

Hemmens, *Advanced Legal Research Courses: A Survey of ABA-Accredited Law Schools*, 94 LAW LIBR. J. 209, 226, 2002 LAW LIBR. J. 17, ¶ 39; Nancy B. Talley, *An Old Problem Needs a New Solution: Incorporating Librarian-Led Legal Research Instruction into Directed Research*, 33 LEGAL REFERENCE SERVS. Q. 292 (2014); Tung, *supra* note 11, at 289–90.

109. See Dent, *supra* note 2, at 121.

110. See Jafari, *supra* note 1, at 33. This hypothetical is adapted from a similar example in the article where Jafari discusses digital teaching assistants in education. The relevant regulation is Airworthiness Directives; Airbus Airplanes, 80 Fed. Reg. 40942 (July 14, 2015).

admittedly this type of interaction may ultimately increase the length of the reference interaction, in the end, the patron's question will be answered correctly and completely.

Information Literacy Instruction

¶27 Incorporating agent technology into information literacy instruction provides the perfect opportunity to help foster student learning.

Why Information Literacy Instruction Requires a New Approach

¶28 Legal research is a fundamental skill in the law school curriculum.¹¹¹ However, practitioner responses to a recent AALL legal research survey suggest that law students lack many important legal research skills.¹¹² Specifically, a large percentage of law students do not know how to conduct research relating to administrative law, regulations, legislative history, and nonlegal materials.¹¹³ Practitioners have noted that law students are not thorough researchers or prepared for many aspects of practice.¹¹⁴ Today's law students may lack many legal research skills because they fail to obtain a solid foundation in research during college, including mastering basic concepts such as Boolean operators and index browsing.¹¹⁵ The use of agent technology may help improve students' legal research skills by engaging them more fully in the learning process.¹¹⁶

How Intelligent Agents and Artificial Intelligence Should Be Incorporated into Information Literacy Instruction

¶29 Incorporating agent technology into advanced legal research courses offered at many law schools provides the perfect opportunity to make students more active participants in the learning process, ultimately fostering student

111. AM. BAR ASS'N, SECTION OF LEGAL EDUC. & ADMISSIONS TO THE BAR, LEGAL EDUCATION AND PROFESSIONAL DEVELOPMENT—AN EDUCATIONAL CONTINUUM: REPORT OF THE TASK ON LAW SCHOOLS AND THE PROFESSION: NARROWING THE GAP 145 (1992).

112. ALL-SIS TASK FORCE ON IDENTIFYING SKILLS & KNOWLEDGE FOR LEGAL PRACTICE, A STUDY OF ATTORNEYS' LEGAL RESEARCH PRACTICES AND OPINIONS OF NEW ASSOCIATES' RESEARCH SKILLS 83–85, 94 (June 2013), <http://www.aallnet.org/sections/all/storage/committees/practicetf/final-report-07102013.pdf>.

113. *Id.*

114. ALL-SIS TASK FORCE ON IDENTIFYING SKILLS & KNOWLEDGE FOR LEGAL PRACTICE, A REPORT OF THE QUALITATIVE RESPONSES FROM THE SURVEY OF PRACTITIONERS ON THE LEGAL RESEARCH PRACTICES AND OPINIONS OF NEW ASSOCIATES' RESEARCH SKILLS 28, 35, 54 (June 2015), <http://www.aallnet.org/sections/all/storage/committees/practicetf/Report-of-Qualitative-Responses-from-Practitioners-2015.pdf>.

115. Ian Gallacher, "Who Are Those Guys?" *The Results of a Survey Studying the Information Literacy of Incoming Law Students*, 44 CAL. W. L. REV. 151, 178 (2008); 2003–2004 Completed Research Grant Projects: *Assessing Information Literacy Among First Year Law Students: A Survey to Measure Research Experiences and Perceptions*, 96 LAW LIBR. J. 867, 867, 2004 LAW LIBR. J. 54 ¶¶ 3–5; Sarah Valentine, *Legal Research as a Fundamental Skill: A Lifeboat for Students and Law Schools*, 39 U. BALT. L. REV. 173, 173–74 (2010).

116. Jafari, *supra* note 1, at 29–30; Frederick B. Jonassen, *On-Line Legal Research Workshops*, 22 ST. THOMAS L. REV. 470, 502 (2010) ("The performance of legal research is a skill, and, like any other skill, it is learned by doing and not by listening."); James B. Levy, *Escape to Alcatraz: What Self-Guided Museum Tours Can Show Us About Teaching Legal Research*, 44 N.Y.L. SCH. L. REV. 387, 406 (2001) (Legal research is a "skill best learned by doing it."); Shang, Shi & Chen, *supra* note 8, at 1.

learning.¹¹⁷ An intelligent instruction assistant can help personalize the learning experience by considering each student's previous courses, activities, and employment experience.¹¹⁸ For example, if a librarian has determined that it is important for a student to identify the resources to conduct federal legislative history research, agents can help the librarian design activities and simulations that take into account the student's background and experience. For a student who has an internship with a federal judge and is also taking an administrative law course, then appropriate exercises designed by the intelligent instruction assistant could require the student to identify resources pertinent to the Clean Air Act Amendments of 1977 that gave rise to *Chevron U.S.A., Inc. v. National Resources Defense Council, Inc.*¹¹⁹

¶30 In addition, exercises created by agents may also help students learn indispensable skills. For example, agents may help students learn how to navigate the new Google-like platforms that many proprietary fee-based systems have adopted. The activities and exercises created by the agent-based tutor should emphasize how to use terms and connectors, identify relevant databases, and limit search results. Exercises designed by agents can also teach students how to browse indexes and tables of contents, a skill that is often overlooked by many of today's students.¹²⁰

¶31 Agents can also create virtual environments where students interact with simulated clients with "real" legal problems.¹²¹ Agents could construct various scenarios and outcomes, depending on how a student approaches the legal problems presented in the simulation. For example, an agent-based tutor could create a simulation where the student is required to identify possible causes of action after a client interview. In response, the student must then draft a complaint setting forth the appropriate causes of action. At the end of the simulation, the student would receive feedback and additional instruction, if necessary, from the agent-based tutor. These types of exercises provide opportunities for students to become active participants in the learning process, which helps foster student learning.¹²²

¶32 Agent technology can also assist librarian instructors with administrative tasks:

[T]he instructor is expected to regularly check students' progress by visiting many Web pages and using different tools within the [content management system] to verify student progress and participation. This includes monitoring the message board activities log to verify student participation, consulting the drop box tool to see if students have submitted assignments, and regularly visiting the course activity log to monitor the magnitude of students' online activities. Performing these tasks in addition to handling hundreds of e-mail messages has become a major time-consuming operation for most instructors.¹²³

117. Baylor, *supra* note 1, at 38–39; Jafari, *supra* note 1, at 30; Jonassen, *supra* note 116, at 502; Levy, *supra* note 116, at 406; Shang, Shi & Chen, *supra* note 8, at 1.

118. See Shang, Shi & Chen, *supra* note 8, at 5.

119. 467 U.S. 837 (1984).

120. Brooke J. Bowman, *Researching Across the Curriculum: The Road Must Continue Beyond the First Year*, 61 OKLA. L. REV. 503, 529 (2008) ("Since our law students grew up on the Internet, they overlook valuable resources because they do not understand what content is available in what type of sources and do not take the time to understand basic research strategies such as, using indices, consulting table of contents, and starting with general terms and working to more specific terms.").

121. See *Advanced Distance Education (ADE)*, *supra* note 66; Rubin, Chen & Thorimbert, *supra* note 7, at 505–06.

122. Baylor, *supra* note 1, at 38–39; Jafari, *supra* note 1, at 30; Shang, Shi & Chen, *supra* note 8, at 1; see also Jonassen, *supra* note 116, at 502, Levy, *supra* note 116, at 406.

123. Jafari, *supra* note 1, at 28.

¶33 Agents can compile information about students' lack of class participation or incomplete assignments, giving the librarian information about students who may be struggling.¹²⁴ Librarians can then use information about student participation to reach out to these students to provide additional instruction or guidance.¹²⁵ In addition, agents can compile data about student achievement to be used during course assessments, a new point of emphasis for the American Bar Association (ABA).¹²⁶

¶34 Librarians should also consider incorporating agents into courses taught remotely,¹²⁷ as students learn through distance education:

[E]arly and continued evidence suggests that students using technology in distance education have at least similar learning outcomes to students in traditional classrooms. In some studies, distance learning students out-learn and outperform students educated in the traditional classroom.¹²⁸

¶35 Currently, the ABA allows second- and third-year law students to take up to fifteen credits (twenty-three percent of the sixty-four total credits required for graduation) of distance education toward their Juris Doctor degrees.¹²⁹ Many ABA accredited law schools offer distance education classes, either synchronously or asynchronously.¹³⁰ Librarians can add value to these courses by incorporating agent technology into information literacy instruction.¹³¹ As the IDEAL and Hunter College examples show, agents can create effective digital learning experiences through customized activities, around-the-clock access to information, and on-demand instruction.¹³² Using agent technology in these ways may enhance students' learning experience and ultimately foster student learning.¹³³

Circulation

¶36 Agents can also be used to streamline many circulation functions. RFID microchips can be placed in print resources to accurately identify the location of

124. See *id.* at 30.

125. See *id.* at 30–31.

126. See Am. Bar Ass'n Section of Legal Educ. & Admissions to the Bar, Managing Director's Guidance Memo, Standards 301, 302, 314, & 315, at 1, 5 (June 2015), http://www.americanbar.org/content/dam/aba/administrative/legal_education_and_admissions_to_the_bar/governance_documents/2015_learning_outcomes_guidance.authcheckdam.pdf [<https://perma.cc/T9B8-PPF7>].

127. See Balleste, *supra* note 9, at 12–13 (“Just think of the potential [for artificial intelligence], not to mention the benefits for distance education.”).

128. Richard A. Westin, *The Need for Prompt Action to Revise American Law Schools*, 46 AKRON L. REV. 137, 159 (2013).

129. See AM. BAR ASS'N, ABA STANDARDS AND RULES OF PROCEDURE FOR APPROVAL OF LAW SCHOOLS 2015–2016, at 19 (2015) (Standard 306).

130. Ellen Q. Jaquette, *Online Education and the Law Library: How Can We Best Serve Our Online Patrons?*, AALL SPECTRUM, Feb. 2015, at 33, 33 (“[T]he number of law schools offering online courses using synchronous (real-time) or asynchronous (on your own time) methods, [is] already at 23 percent and 25 percent of law schools in 2010, respectively.”).

131. See *id.* (“Thirty-eight percent of [the survey] respondents offered for-credit courses on legal research, while 76 percent provided other opportunities for research training. Overall, more respondents listed research training than lending books as a service provided to distance learners, a seemingly more traditional function of the library.”).

132. See Shang, Shi & Chen, *supra* note 8; see also Dent, *supra* note 2, at 121.

133. See Baylor, *supra* note 1, at 38–39; Jafari, *supra* note 1, at 30; Jonassen, *supra* note 116, at 502; Levy, *supra* note 116, at 406; Shang, Shi & Chen, *supra* note 8, at 1.

library materials.¹³⁴ Agent technology can also be used to check in and out materials to patrons, provide use count information, and recommend other materials that may be of interest to them.¹³⁵ In an era when libraries are trying to do more with less, automating some of these functions may free up time for the staff to answer patron questions and work on more labor-intensive library projects.

The Drawbacks of Using Intelligent Agents and Artificial Intelligence in Academic Law Libraries

¶37 Despite the many benefits of agent technology and artificial intelligence, certain drawbacks cannot be ignored. Artificial intelligence is not without its critics. Some argue that artificial intelligence may lead to unemployment.¹³⁶ Others argue that humans simply do a better job of providing customer service and cannot be replaced by technology.¹³⁷ Visionaries in the fields of science, computing, and the Internet, including Stephen Hawking, Bill Gates, and Elon Musk, have been cited as opponents of artificial intelligence, claiming that thinking computers may harm humans and society.¹³⁸ Their concerns may have validity, as autonomous weapons systems and artificial intelligence that outsmarts humans have been discussed as possibilities in the future.¹³⁹

¶38 The cost of artificial intelligence may be another significant concern for academic law libraries. In the current era of tight budgets, where book budgets are being slashed and every dollar spent is scrutinized, using this technology may be cost prohibitive. It is difficult to quantify the cost of artificial intelligence, but with the millions of dollars that companies such as Google are spending on development,¹⁴⁰ it is reasonable to believe that the use of this technology may come with a hefty price tag. However, agent technology may provide some lower-cost options.¹⁴¹

134. Minami, *supra* note 96, at 243.

135. *See id.* at 240.

136. Martin Ford, *Viewpoint: Could Artificial Intelligence Create an Unemployment Crisis?*, COMM. OF THE ACM, July 2013, at 37, 39 (“I think there are good reasons to be concerned that advances in artificial intelligence and robotics are rapidly pushing us toward an inflection point where the historical correlation between technological progress and broad-based prosperity is likely to break down—unless our economic system is adapted to the new reality.”).

137. *See* John N. Berry III, *Humans Do a Better Job*, LIBR. J., Apr. 1, 2006, at 10, 10 (“Of course, machines can do many jobs better than live humans. But in public service and public information enterprises, machines are rarely better at even routine jobs like reshelving books.”).

138. *See* Kolodny, *supra* note 25 (“Hawking lays out concerns that seem straight out of a sci-fi horror film—essentially worrying that eventually the machines will outsmart us all.”); Nick Statt, *Bill Gates Is Worried About Artificial Intelligence Too*, CNET (Jan. 28, 2015, 12:55 PM), <http://www.cnet.com/news/bill-gates-is-worried-about-artificial-intelligence-too/> [<https://perma.cc/CMH9-AJUB>] (“Microsoft’s co-founder joins a list of science and industry notables, including famed physicist Stephen Hawking and Internet innovator Elon Musk, in calling out the potential threat from machines that can think for themselves.”).

139. Kolodny, *supra* note 25; *Stephen Hawking*, *supra* note 43.

140. Kolodny, *supra* note 25.

141. *See* McNeal & Newyear, *supra* note 7, at 111 (“[The library’s chatbot] answered a total of 4774 library related questions in 2011; the cost of providing this service was \$0.14 per use. As library funding continues to erode and chatbots become more intelligent, automated reference services will become an increasingly attractive option, if not a necessity.”).

Libraries should also consider consortia arrangements, allowing participating libraries to share the financial burdens associated with such technology.¹⁴²

¶39 The use of agent technology in academic law libraries also raises privacy and other legal concerns. “[C]ollecting and using learning data could create legal challenges for educational institutions. Universities should develop . . . appropriate policies for the collection of student learning data.”¹⁴³ To alleviate these concerns, students may be identified by an anonymous number system, as they are during exams, to help protect their personal information. Patrons could also be grouped and identified in simple categories, such as “student,” “faculty,” or “public patron,” to help ensure that their privacy is maintained. Public access computers containing agents should be equipped with mechanisms to protect patrons’ private information. Law school IT departments should ensure that browsing and use history are erased after each user logs off of public access computers. Librarians must also balance issues of patron privacy with continued advancements in artificial intelligence that can be achieved by using transcripts of reference interactions between patrons and intelligent reference assistants. To this end, libraries should establish a policy where patron information is routinely purged from computer servers once librarians have had the opportunity to review reference transcripts.

¶40 Librarians who work for law libraries that are open to the public must also take precautions to ensure that agent technology is not perceived by patrons as engaging in the practice of law. The role of agents is to offer information and not legal advice.¹⁴⁴ The unauthorized practice of law by agents or artificial intelligence is a real concern in light of *Unauthorized Practice of Law Committee v. Parsons Technology, Inc.*, where the U.S. District Court for the Northern District of Texas found that a computer program engaged in the unauthorized practice of law by tailoring legal forms to individuals’ particular needs.¹⁴⁵ The computer program created “an air of reliability . . . which increase[d] the likelihood that an individual user w[ould] be misled into relying on them.”¹⁴⁶ *Parsons Technology* provides guidance

142. Christine N. Turner, *E-Resource Acquisitions in Academic Library Consortia*, 58 LIBR. RES. & TECH. SERVS. 33, 37 (2013) (“Throughout the history of consortia, cost savings have been touted as a benefit of cooperative collection development, but in fact, cost sharing and containment more accurately describes the reality.”).

143. Jafari, *supra* note 1, at 33.

144. See Charles J. Condon, *How to Avoid the Unauthorized Practice of Law at the Reference Desk*, 19 LEGAL REFERENCE SERVS. Q., no. 1/2, 2001, at 165, 166 (discussing the role of information providers as “providing information within the limits imposed by institutional policies and professional standards”).

145. *Unauthorized Practice of Law Comm. v. Parsons Tech., Inc.*, No. Civ.A. 3:97CV-2859H, 1999 WL 47235, at *6 (N.D. Tex. Jan. 22, 1999), *aff’d*, 179 F.3d 956 (5th Cir. 1999) (“Subsequent to the filing of this appeal, however, the Texas Legislature enacted an amendment to §81.101 providing that ‘the ‘practice of law’ does not include the design, creation, publication, distribution, display, or sale . . . [of] computer software, or similar products if the products clearly and conspicuously state that the products are not a substitute for the advice of an attorney,’ effective immediately.”); Condon, *supra* note 144, at 174 (“In Texas, the Unauthorized Practice of Law (UPL) Committee argued that ‘Quicken Family Lawyer,’ a software program designed to assist in the preparation of probate forms among other legal documents, was actually a ‘cyberlawyer’ practicing law without a Texas license. Although the federal district court agreed with the UPL committee, the Texas legislature amended the statute to exclude software from the definition of authorized practice.”); see also Pat Newcombe, *Web Regulation Battles Heat Up*, AM. LIBR., Nov. 1999, at 50.

146. *Parsons Tech.*, 1999 WL 47235, at *6.

with respect to the safeguards that must be in place to ensure that unrepresented patrons understand the limited role of artificial intelligence. Agents or conversational agents should only provide patrons with a list of available resources along with a brief explanation on how to access and use each resource.¹⁴⁷ Agent-based computer programs must also include disclaimers directed to patrons, notifying them that its function is only to provide information and not to give legal advice.¹⁴⁸

¶41 This discussion of the drawbacks of agent technology and artificial intelligence is not meant to be an exhaustive list. Rather, its purpose is to highlight some of the most significant concerns associated with these technologies for academic law libraries. Despite valid drawbacks, the benefits to students and patron services outweigh these concerns. Integrating agent technology now and more sophisticated artificial intelligence in the future into academic law libraries will help librarians and library staff provide the highest level of service to the entire law school community.

Conclusion

¶42 The world of artificial intelligence, with all of its “possibilities, demonstrations, and promise,”¹⁴⁹ is a virtually untapped resource for academic law libraries. Many academic law librarians pride themselves on being on the cutting edge of technological advancements. The services provided by academic law librarians as educators and public servants lend themselves to the exploration of agent technology and artificial intelligence in the classroom, at the reference desk, and in circulation. Considering ways to incorporate these technologies into academic law libraries provides the perfect opportunity to improve the services provided to the entire law school community and all library patrons now and in the future. Academic law librarians can learn how to effectively use conversational agents, artificial reference and circulation agents, and information literacy modules to serve law library patrons from other libraries and the field of education. The uses for artificial intelligence will likely expand to include services that we have yet to imagine. Academic law librarians should embrace these ideas and champion agent technology and artificial intelligence for the entire law school community.

147. See *id.*; see also Condon, *supra* note 144, at 170–73 (providing guidance on formulating a reference policy to avoid the unauthorized practice of law).

148. See *Parsons Tech.*, 1999 WL 47235, at *6; see also Condon, *supra* note 144, at 171.

149. DAVID POOLE & ALAN MACKWORTHY, ARTIFICIAL INTELLIGENCE: FOUNDATIONS OF COMPUTATIONAL AGENTS ch.1, http://artint.info/html/ArtInt_2.html [<https://perma.cc/MYA2-C3H6>] (quoting Bruce Buchanan).