Eric J. Kyle
College of Saint Mary, Omaha, NE
EKyle@CSM.edu
2013 REA Annual Meeting, Nov 8-10

'INTELLIGENT' RELIGIOUS EDUCATION?: POSSIBILITIES FOR INTEGRATING ARTIFICIAL INTELLIGENCE AND OTHER ASSISTIVE TECHNOLOGIES

Eric J. Kyle
College of Saint Mary
Omaha, NE

Abstract

This paper will explore the potential for technology-based tools to transform religious education. These technologies, such as the Web and collaborative computer systems, social simulations, and artificial intelligence algorithms, are already making major contributions to public education and may influence how we both view and approach our field. This paper will therefore look at specific examples of the kinds of technologies that are being used in education and in other fields. The potential strengths and noted limits of these technologies will also be outlined. Practical and theological reflections will be provided as will the possibilities for the field of religious education to chart new directions with these technologies.

INTRODUCTION

Maurice is a Euro-American religious educator who is working with a group of second and third generation Chinese-American youth. In addition to

helping these youth to navigate their identity and intercultural development in an urban U.S. context, Maurice would like to help them to grow in their faith as well as in their relationships with one another. Yet, even working with this small group of 20-30 youth seems daunting. Maurice wonders at all of the different dynamics and factors that there are to consider such as the intercultural influences in their lives, their own unique personalities, the cliques that they are forming within the group as well as in other parts of their lives, and many other complexities. Maurice struggles with what goals to set for the group, how to go about pursuing these, and what kinds of assessment tools to draw from for their program. Maurice has read some of the criticisms lodged against the effectiveness of discipleship programs (Hull 2006, 41-44; McCallum and Lowery 2006, 34) and wants to be more successful in this work. Overall, Maurice admittedly feels overwhelmed by the immensity of these considerations, wondering how the program will ever come together.

This situation is indicative of the instructional design and program development challenges that religious educators face on a regular basis. Psychological and sociological dynamics are complex in and of themselves, but so too are the many factors that contribute to the discernment, design, and implementation of even a single program (Kyle In Press). However, there is also a great wealth of resources that are available from our religious traditions as well as contemporary fields such as neuroscience, education, psychology, counseling,

organizational development, and sociology, to name just a few. Nonetheless, how are we to effectively access and utilize such resources when there are so many of them? Given this, we might wonder whether there might be additional tools that can support our program development work.

This paper explores technology-based tools that may not only help religious educators in their program design and implementation, but might also have the potential to transform how we fundamentally engage in our work. Looking primarily to the field of education, the paper will look more specifically at how recently emerging technologies have and will continue to reshape public school classrooms and other educational systems (Woolf 2008, Kindle Locations 8578-8581). More specifically, we will be exploring how the Web and collaborative computer systems, social simulations, and artificial intelligence algorithms are transforming the face of education. Following this, some of the recognized strengths and limits of these technologies will be highlighted. Throughout these explorations and more fully in the third part of this paper possibilities for how religious educators might integrate these technologies are discussed. Finally, in the closing paragraphs, we consider some of the potential theological implications and invitations for this work and our field.

TANTALIZING TECHNOLOGIES!

As technologies have become more prolific in our world, the number and kinds of technologies has skyrocketed. From virtual worlds and games to hand held wireless devices with voice recognition systems, there seems to be no end in sight to ingeniousness and creativity with which technologies are being created and adapted for our lives. In a short paper such as this, one cannot possibly hope to cover the fuller range of technologies that are currently available. As a result, this section will highlight three kinds of technology that may have the potential to significantly impact our work as religious educators. Given Maurice's case example described above, these are technologies that may be able to aide practitioners in similar situations.

Web-based, WILD, & Collaborative Technologies

"The World Wide Web is the world's largest and most flexible repository of educational material, providing resources varying from simple libraries to fully integrated, intelligent applications," writes educator Beverly Woolf (Woolf 2008, Kindle Locations 7522-7524). It is clear now that the Web is radically transforming education with more than 6.7 million students having taken at least one online course in 2012 and the percentage of college students taking online courses doubling from 23% to 45% over the last five years (Blair January 8, 2013; Bolkan June 24, 2013). In addition, as Woolf asserts, the Web is enabling global

access to vast amounts of information that are virtually available around the clock. The Web therefore not only allows anyone with access to a computer to engage these resources, but it is also a vast network that connects billions of documents and people annually (Woolf 2008, Kindle Locations 7526-7530).

In addition, there are an increasing number of Wireless Interactive Learning Devices (WILDs) that are being developed and utilized. The small size of handheld technologies is enabling learning to happen in more portable ways. WILDs, which allow users to access and interact with material both within and outside of the classroom, are now being used in informal settings such as museums to give tours, on field trips to record experiences and reactions for later discussions, and by school faculty and staff to empower easier data sharing and access on the fly (Pea and Maldonado 2006, Kindle Locations 15962-15968, 15981-15987, 15993-15997, 16018-16023). Within the classroom, students can use small handhelds to access and compare Web information with one another in a small group setting, as opposed to being gathered around a single computer (Pea and Maldonado 2006, Kindle Locations 15828-15835, 15843-15845, 15869-15870). Such changes are also empowering teachers to work more as a facilitator than a direct deliverer of material. These technologies are allowing teachers to monitor and alter student interactions more closely both with the material as well as with each other (Pea and Maldonado 2006, Figure 25.1).

Such collaborative learning is finding increasing importance in education and a number of technologies, known as computer-supported collaborative learning (CSCL), are being developed to help support these pedagogies (Stahl, Koschmann, and Suthers 2006, Kindle Locations 15052-15054, 15066-15070). For instance, there are an increasing number of websites that help teachers to support one another as well as ones that offer online mentoring for students.[1] In addition, adaptive software programs are being developed to help improve the quality of how students, teachers, and tutors interact with one another (Walker, Rummel, and Koedinger In Press). The basic hope for CSCL technologies is to help teachers and students to facilitate the learning processes in more socially distributed ways.

For religious education, these Web-based, WILD, and CSCL innovations have the potential to reshape how we engage in our craft. Returning to our case example above, Maurice can access Web-based research and resources that explore and describe some of the intercultural dynamics that the youth may be experiencing as well as those that discuss theories and pedagogies that may be relevant for their unique urban context. Using handhelds, such as smart phones, these youth are likely to already be connected to one another on a regularly basis

---

[1] For examples, see such sites as: the Knowledge Forum, which provides teachers and students an online space to collaborate (http://www.knowledgeforum.com); and Amumba, a social

via such social sites as Facebook, Twitter, Instagram, and texting. Clearly, there are possibilities here for Maurice to interact with them in a more ongoing fashion outside of their face-to-face time together. In addition, it might also be possible to create CSCL software that helps these youth to have richer and deeper conversations with one another that are more relevant to their own religious, identity, cultural, and others kinds of formation.

Using mobile devices along with the Web, there might also be a place to develop more interactive software. For instance, if Maurice was currently teaching them about the local religious and cultural history of their community, the youth might be asked to visit certain sites around town. Upon their arrival at each location the relevant information that Maurice wants them to know would be automatically delivered to their smart phones or handheld devices. The use of these specific technologies is really only limited by ones imagination and abilities to develop them, and these are but a few and very simple ways that religious education might be broadened both in terms of how we think about and engage in our work.

Social Simulations

---

mentoring site (http://amumba.com/).

Social simulations use quantitative and qualitative models that are intended to represent and approximate specific dynamics in the world (Banks 2010, 1). These simulations are being used in such fields as psychology, sociology, and organizational development (Dietrich et al. 2009; Rouse and Boff 2005; Sun 2008; Takahashi, Sallach, and Rouchier 2007). In education, more specifically, simulations have been developed to predict a student's sense of "belongingness" to a content area such as math, the effects of a student's classroom seating location on achievement, and to evaluate classroom misbehavior issues (Lijun and Chunxiao 2009; Manan June 30, 2011; Marotta March 22, 2012).

These technologies are even beginning to find their way into religion. Researchers such as Laurence Iannaccone and Michael Makowsky at George Mason University and Professor of Anthropology James Dow have created simulations that seek to better understand the existence of religion in evolution and some of the reasons for why people make the religious choices that they do (Dow 2008; Iannaccone and Makowsky 2007). Beyond this, theorists and theologians such as Ted Metzler, Amanda Beyers, and John Goulden at Oklahoma City University suggest using these kinds of simulations to test different theories of God's actions in the world (Metzler, Beyers, and Goulden 2004). Their aim is to create a social simulation where different models of God's actions may be compared to one another as well as to secular scientific models.

Might these technologies also find their way into religious education? Imagine if Maurice could develop such simulations to model group dynamics among the youth. It might even be possible for Maurice to test how an anticipated activity might go for the group before ever standing in front of them. These simulations might also be used to help Maurice to better understand each individual. This is because, in order to develop them, the author of the simulation must have a precise understanding of the individuals (or "agents"). Creating agent-based models can therefore lead to deeper insights and richer understandings of the individuals that they are intended to model. As with the technologies discussed above, social simulations therefore seem to have the potential to alter how we plan for and implement our programs.

Artificial Intelligence Algorithms

Of all of the technologies currently being developed and utilized in the field of education, artificial intelligence algorithms seem to have the greatest potentials for radically transforming our field. One example of how these technologies are already impacting education is intelligent tutoring systems (ITS). These systems help students to learn the content of a specific course by presenting them with problems and then providing detailed hints and feedback that are tailored to the student's current capabilities (Woolf 2008, Kindle Locations 393-

397). Research on human tutors has shown that "students tutored by master teachers performed better than 98% of students who received classroom instruction" (Woolf 2008, Kindle Locations 4119-4125). Using artificial intelligence algorthims, ITS seek to approach this level of human tutoring effectiveness.

To help us to see how such intelligent algorithms and ITS work, consider the Andes Physics Tutor that was designed to help students to learn introductory physics at the high school and college levels (Woolf 2008, Kindle Locations 4762-4767).[2] In essence, Andes tracks a student's reasoning and progress and generates an internal model of the student (Woolf 2008, Kindle Locations 1336-1337, 3599-3602). Using a probability-based algorithm, known as Bayesian Belief Networks (BBNs), Andes "reasoned about student physics solution plans, future actions, and overall level of knowledge" and compared student's actions with internal expert models (Woolf 2008, Kindle Locations 1336-1337, 1935-1939, 3599-3602, 6297-6303). Based upon this "intelligent" analysis and self-constructed models, this physics tutor would then provide hints and give feedback that are supposed to be tailored to the student's current level of understanding (Woolf 2008, 5378-5379).

---

[2] To learn more about this tutor and to try it out, visit the free and open website for Andes: http://www.andestutor.org/.

In evaluation of Andes, groups of students in college physics classes were required to use the tutor for a face-to-face class that they were taking instead of completing traditional pencil and paper homework, which was required of students in a control group. Students using Andes for homework regularly scored a letter grade higher than did the control group (Woolf 2008, Kindle Locations 4788-4794).

However, as one might imagine, developing ITS is not an easy task. In addition to specialized computer science training, these tutors require a great deal of time to develop and they seem to work best for those content areas where knowledge is well-defined, such as in physics (Woolf 2008, Kindle Locations 3062-3066, 4157-4162). Nevertheless, because it is fully autonomous, once a tutor is built for a course it can theoretically be used by an almost unlimited amount of users simultaneously (dependent upon the delivery system more than on the ITS). The Andes Physics Tutor, for instance, is currently online and being freely and widely used. In addition, some research suggests that these tutors are beginning to close the achievement gap that is based on racial differences and is often seen in our public educational systems (Woolf 2008, Kindle Locations 8593-8598). Globally, these intelligent tutors may very well improve the quality of education on a massive scale.

In addition to ITS, artificial intelligence algorithms are being used to aide educators with such tasks as data mining for massive amounts of information,

CSCL as we have seen above, assessments, and in many other areas where intelligent and adaptive help is needed. So, can these algorithms help religious educators? How might Maurice benefit from their support? Clearly, software programs (intelligent or not) can be and have been developed to aide one in learning about more content specific areas such as what is found in the Bible.[3] Beyond this, however, can ITS be developed to help disciples to be more ethical, think and reason more theologically, and become more socially engaged for instance? While there is an "unintelligent" politeness tutor that is available online,[4] ITS have not shown themselves to be very effective in more ill-defined areas as those just mentioned and particularly in areas where there are multiple solution paths that are possible for a given situation or problem (Woolf 2008, Kindle Locations 3062-3066, 6449-6451).

Nevertheless, the potentials that these algorithms have for helping practitioners with information overload cannot be understated. Already is technology being used to help educators with research-based assessments, but also with more tailored and "just-in-time" learning (Means 2006, Kindle Locations 19041-19045, 19048-19052; Woolf 2008, Kindle Locations 7538-

---

[3] For examples of Bible software, see: http://www.logos.com/; http://www.olivetree.com/.

[4] To learn how to be more polite, visit: http://ctat.pact.cs.cmu.edu/index.php?id=politeness.

7545). Imagine if such intelligent support were available to Maurice, actively providing resources and activities in response to the data that is collected about the youth on a regular basis. What if these algorithms were connected to their social media sites, helping Maurice to stay abreast of the emerging patterns, struggles, and interests of the youth?

Intelligent algorithms might very well be able to aid us in our discernment of which religious education programs to offer and how to deliver them. Coupled with social simulations and the other technologies discussed herein, the programs that Maurice and others might develop would ideally and continually be more timely, relevant, and transformative. Collectively, then, technology-based tools may very well have the potential to radically change not only how we think about religious education, but also how we engage with it via the programs that we develop and implement.

PLUG-INS & POWER FAILURES

From these very brief explorations, we can see that these technologies can be powerful in terms of helping to improve and in some ways simplify the field of education. Indeed, there are many strengths that may be associated with them. However, there are also a number of limitations that technologies, in general, have. In this section, we briefly consider both sides of these tools.

Potential Strengths of These Technologies

The noted strengths of these technologies are numerous, with three in particular that we will highlight here. First, these tools can be highly portable, adaptable, and engaging and can more easily support student-centered and constructivist approaches to education. In CSCL applications, for instance, technology can help to improve not only the efficiency but the quality of social interactions among students and are easily reconfigurable to meet the specific needs of each classroom (Stahl et al. 2006, Kindle Locations 15456-15472). Such ease of adaptability and communication is helping to support the rise of coaching and mentoring pedagogies that are central to constructivist views of education (Fishman and Davis 2006, Kindle Locations 20249-20261). Handhelds and other portable technologies are also allowing students to conduct more engaging and meaningful fieldwork (Pea and Maldonado 2006, Kindle Locations 15811-15817). Games and other virtual environments can also create engaging activities through use of personality-rich pedagogical agents who interact with students and lead them through various phases of learning and these agents can be designed to engage multiple learning styles (Richey, Klein, and Tracey 2011, pp. 99-100; Woolf 2008, Kindle Locations 3010-3013). Not only can some of these technologies be used to increase student motivation, they can also be designed to

be continually adaptive to each student's personal needs via artificial intellingence and other algorithms (Blumenfeld, Kempler, and Krajcik 2006, Kindle Locations 17883-17884, 17889-17892, 17902-17904, 17912-17914; Woolf 2008, Kindle Locations 1019-1021, 3017-3021).

Secondly, as technology continues to become more widespread, they are becoming increasingly more cost effective. According to some researchers, there may come a time of "ubiquitous computing," wherein technology is so integrated into our life and world that they are used naturally and smoothly (Pea and Maldonado 2006, Kindle Locations 15773-15780). Already in Higher Education is technology changing the way that education is being viewed both in terms of cost-effectiveness and delivery. The Massachusetts Institute of Technology (MIT), for instance, offers what is known as Open Courseware, which are classes that are available for free to anyone with access to the Web (Woolf 2008, Kindle Locations 7571-7575).[5] Such freedom and openness is beginning to challenge the very philosophical foundations of education that has traditionally been viewed in terms of geography (Woolf 2008, Kindle Locations 7564-7567). In other words, students no longer need to physically be in the same place as where the courses are designed and delivered and schools are saving costs with these online technologies as well as with on-site ones. Virginia Tech University, for example,

[5] For more information on this, visit MIT's website: http://ocw.mit.edu/about/.

has created a "math emporium" center that houses more than five hundred computers that are used to support and deliver numerous math classes.[6] This center reportedly "serves nearly seven thousand math students each year, at less than half the cost of the lecture courses it replaced, and with higher student math scores and student satisfaction" (Sawyer 2006, Kindle Locations 21453-21459). Hence, as technology increases in availability, functionality, and cost-effectiveness they are changing not only the quality of education but also its financial bottom line.

Finally, as we saw most clearly for artificial intelligence algorithms, a growing number of tools are being developed to augment human capabilities in terms of data processing and decision-making and our theories of education are being impacted as a result. As was mentioned above, computer programs have the ability to process massive amounts of data in very short time periods and can be designed to help highlight emerging patterns and trends (Woolf 2008, Kindle Locations 7538-7545). BBNs and artificial neural networks are being used to help students and teachers alike to process data and reason about the concepts they are studying (Means 2006, Kindle Locations 19112-19116, 19121-19124, 19133-19137; Woolf 2008, Kindle Locations 5794-5797). Other intelligent algorithms,

---

[6] For more information, visit the Math Emporium Website: http://www.emporium.vt.edu/.

such as Reinforcement Learning and Hidden Markov Models, are being used to generate teaching policies based upon mass student data and to predict student problem-solving strategies with as much as a 90% accuracy for some applications (Woolf 2008, Kindle Locations 5981-5984, 6122-6124). These intelligent technologies are not only helping educators to better understand how teaching and learning occur, they are also being used to create and verify various theories of learning (Woolf 2008, Kindle Locations 4157-4162). Indeed, the current and future contributions of these technologies are not only quite numerous, they are potentially revolutionary for fields such as education as well as our own.

Noted Limitations

Nevertheless, as we have already seen above, there are also a number of limitations that these technologies have and two in particular will be highlighted here. First, in spite of numerous data suggesting that ITS can consistently outperform traditional direct instruction classroom in some fields, they have not been able to approach the quality of more student-centered approaches such as one-on-one human tutoring (Means 2006, Kindle Locations 19141-19147). As we might expect, humans are able to provide guidance that is more insightful, timely, and individually relevant to students. Relatedly, multimedia-rich technologies such as games, virtual worlds, and videos can actually become so overly

stimulating that they distract students from actually learning the content at deeper levels (Richey et al. 2011, pp. 44-45). Overall, the impact that current technologies can have is limited in both the kind of learning that they can provide as well as the quality of it.

A second set of limitations are related to the preparation and implementation of many of these technologies. One of the major critiques of them in education has been in how they are actually being used in the classroom. For instance, studies have discovered that technology was being generally used more as add-ons to direct instruction rather than to foster the kinds of deeper learning that are the focus of our schools (Sawyer 2006, Kindle Locations 776-784; Schofield 2006, Kindle Locations 19581-19583, 19617-19622). Best practices in educational technology stipulate that these technologies should be integrated in ways that centrally further the learning goals of the classroom and this has not been happening in classrooms to the extent that it should be (Quintana et al. 2006, Kindle Locations 5099-5106; Schofield 2006, Kindle Locations 19581-19583, 19617-19622).

As a result, it has become quite apparent that the integrated use of technology requires additional training to effectively utilize them. Teachers must be very intentional about which tools they are going to use and how they are going to use them. They therefore need to know these technologies in-depth and additional training is a necessary prerequisite to their use. In addition, more

teacher effort in the classroom is required because students too need additional help in learning and being able to effectively make use of these tools (Stahl et al. 2006, Kindle Locations 15086-15087, 15091-15095; Woolf 2008, Kindle Locations 7668-7670).

While we might walk into our kitchen or garage and use technologies that make our life easier and faster with little knowledge of how they work, the current state of educational technologies does not yet seem to follow this paradigm. On the contrary, as we saw with ITS, the time, background, and experience required to develop and modify the more complex technologies is quite significant. As a result, some of these technologies, such as artificial intelligence algorithms, have been slow to catch on because of the effort and education that is required to adapt them for local applications (Woolf 2008, Kindle Locations 5019-5020). As has been the trend with technology in general, however, such limitations may diminish as their usability and the general public's experiences and education with them increases. Nevertheless, these are just some of the challenges that practitioners will face as they seek to integrate more and more of these tools into their craft.

FINDING GOD IN THE GRID: CLOSING REFLECTIONS

Despite these limitations, as we have seen, there are a number of possibilities for how practitioners such as Maurice might be greatly aided in their program planning and implementation. Putting the technologies together, imagine if there were data mining algorithms that could provide Maurice with more detailed information from web-based research journals and other practitioners that were relevant for the programs that the youth will engage. Imagine if software were available that could help Maurice to build models of each youth based on both this collected information as well as on Maurice's own observations and reflections. What if these models could then be used to run simulations that gave Maurice an idea of which lessons and activities might work better with the youth beforehand. Imagine if this software could help Maurice implement the programs via WILDs and other collaborative technologies. Finally, what if intelligent algorithms could help Maurice to gather in-vivo observations and assessments that could then be used to update the models and provide a more accurate and ever developing picture of the complex dynamics that Maurice faces on a regular basis. Might such applications really be possible in the near future? Can they be used to genuinely improve the quality and effectiveness of our religious education programs? As I have tried to argue throughout this paper, the technologies emerging in the last few decades have the potential to radically alter not only how we engage in our craft but also how we think about our field.

Their impact also goes beyond what was just described. To help illustrate this point more fully, consider the following. In recent years, a number of school districts across the country, such as in Florida, have launched middle and high schools that are offered completely in an online format.[7] What if religion began to use these technologies to create completely online communities? Think that it can't be done? Then, consider this: there is currently a free, 3-D, online virtual world known as Second Life which offers its users a number of islands that one can visit.[8] Users create their own personas, known as "avatars," and can explore this world extensively on their own. In Second Life, there is an island, known as Epiphany Island, on which is housed an Anglican Cathedral where visitors can go for worship, scripture studies, small group interactions, and much more.[9] In essence, Epiphany Island is intended to be its own church for members in the virtual world. Could this be the future of religious education, one where we are called to develop virtual Sunday schools, technology-driven theological education experiences, and "intelligently" supported faith formation groups?

---

[7] For a list of schools that offer this, see: http://www.k12.com/schools-programs. To see an example of one of these schools, visit the Florida Department of Education's website at: http://www.fldoe.org/schools/virtual-schools/.

[8] To learn more about Second Life, visit: http://secondlife.com/.

[9] To learn more about this online Cathedral, visit: http://slangcath.wordpress.com/about/.

Looking within the Christian tradition, our religious communities are places where transformation becomes reality, where we are enculturated into new ways of being, and where we receive the support that we need to grow (Cassian 1997, 263; Hull 2006, 188-89; O'Connell 1998, 85-86). They are also the contexts in which we receive much-needed encouragement and empowerment as well as where we are held accountable to the standards that our traditions uphold (Clark 1994, 240; Felder 2002, 99). Summing up these perspectives, Christian religious educators Anne Streaty Wimberly and Evelyn Parker write, "Our churches are essential faith "villages" that generate this wisdom formation through giving gifts of time, information, insights, encouragement, and praise" (Wimberly and Parker 2002, 17). The major concern here is therefore the extent to which this level of formative communal interactions can be accomplished via these technologies. For Christians, we might ask if Jesus' ministry would have been as powerful and formative if it were done completely via the Web.

Another major issue to be addressed is the role that religious educators should have in the development of these tools and in the writing of the policies that govern their use. How might our specifical traditions, in terms of their beliefs, ideals, values, practices, sacred texts, ways of life, et cetera, shape and guide the direction of not only how these technologies are being used but perhaps even in their very design? We have already seen how social simulations are being used to pursue questions of religion in human evolution and possibly to test different

theologies. Should we, as Metzler and his team, have a louder voice and play a stronger role in how these tools are being used?

It therefore seems that there is a dialectic that can happen between these ever emerging technologies and our long standing religious traditions. There are a number of possibilities, perhaps on a spectrum, for how we might engage with them in relation to our faith traditions including: 1) Isolationsim, where we simply ignore their existence and contributions; 2) Tradition-Centered, where we hold our traditions more centrally and seek to modify and integrate these technologies as seems appropriate; 3) Mutually Dialectic, where we the contributions of our traditions and these technologies are considered with equal weighting; and 4) Technology-Centered, where we seek to radically transform our religious ways of being and doing, with technologies leading these changes.[10] In line with the purposes of spiritual discernment, it may be that we and our communities may need to embrace any one of these positions at different times for different situations.

Overall, then, perhaps some of the greatest questions that religious educators from theistic traditions have to face in relation to these technologies are the following: *Does God act within and through them? Does God use them to*

achieve God's aims? If so, then as faith-filled people and practitioners, we have no other choice but to continually discern where and how God is doing this and where God might be calling us to partner with God in the use of these technologies. If not, then we have no other choice but to proactively work to oppose them for we are called, at least in Western Christianity, to stand against distortions of life as much as we are called to stand with God. Nevertheless, whichever side one stands in relation to these questions, there can be no denying that each of us is called to do the same thing, and that is to engage with technology. Perhaps in doing so we will not only continue in the long history of world transformation that is so much a part of our religious histories, but we might even experience change for ourselves and our communities along the way.

REFERENCES

Banks, C. M. 2010. Introduction to modeling and simulation. In *Modeling and simulation fundamentals: Theoretical underpinnings and practical domains*, ed. J. A. Sokolowski and C. M. Banks, 1-24. Hoboken, NJ: John Wiley & Sons.

Blair, B. S. *New study: Over 6.7 million students learning online* [Web page] January 8, 2013 [cited 24 August 2013. Available from http://sloanconsortium.org/publications/survey/changing_course_2012.

Blumenfeld, P. C., T. M. Kempler, and J. S. Krajcik. 2006. Motivation and cognitive engagement in learning environments. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 17538-18109. Cambridge; New York: Cambridge University Press.

---

[10] Of course, there is a fifth possibility, what we might perhaps call "Traditional Abandonment," and that would be to ignore the contributions of our religious traditions altogether and let the technologies dictate future directions.

Bolkan, J. *Report: Students taking online courses jumps 96 percent over 5 years* June 24, 2013 [cited 24 August 2013. Available from http://campustechnology.com/articles/2013/06/24/report-students-taking-online-courses-jumps-96-percent-over-5-years.aspx.

Cassian, J. 1997. *John cassian: The conferences*. Translated by B. Ramsey, *Ancient christian writers*. Mahwah, NJ: Paulist.

Clark, R. 1994. Spiritual formation in children. In *The christian educator's handbook on spiritual formation*, ed. K. O. Gangel and J. Wilhoit, 234-246. Grand Rapids, MI: Baker Books.

Dietrich, D., G. Fodor, G. Zucker, and D. Bruckner, eds. 2009. *Simulating the mind: A technical neuropsychoanalytical approach*. Germany: SpringerWienNewYork.

Dow, J. 2008. Is religion an evolutionary adaptation? *Journal of Artificial Societies and Social Simulation* 11 (22): 2.

Felder, T. D. 2002. Counsel from wise others: Forming wisdom through male mentoring. In *In search of wisdom: Faith formation in the black church*, ed. A. S. Wimberly and E. L. Parker, 89-107. Nashville: Abingdon Press.

Fishman, B. J., and E. A. Davis. 2006. Teacher learning research and the learning sciences. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 20014-20712. Cambridge; New York: Cambridge University Press.

Hull, B. 2006. *The complete book of discipleship: On being and making followers of christ*. Colorado Springs, CO: NavPress.

Iannaccone, L. R., and M. D. Makowsky. 2007. Accidental atheists? Agent-based explanations for the persistence of religious regionalism. *Journal for the Scientific Study of Religion* 46 (1): 1-16.

Kyle, E. In Press. *Living spiritual praxis: Foundations for spiritual formation program development*. Eugene, OR: PICKWICK Publications.

Lijun, W., and Z. Chunxiao. 2009. Artificial-society-based classroom behavior dynamic research. In *Second international symposium on intelligent information technology and security informatics*, ed. F. Yu , G. Yue, J. Shu and J. Zhang, 183 - 187. Piscataway, NJ: The Institute of Electrical and Electronics Engineers, Inc.

Manan. *"Math belongingness" & gendered pathways into different math levels*. Stanford Interdisciplinary Training Program in Quantitative Education Policy Research June 30, 2011 [cited 31 August 2013. Available from http://ies2011.stanford.edu/?p=358.

Marotta, L. *Agent-based modeling of peer effects: A study of the impact of classroom composition on the achievement gap*. Standford University's Computational Modeling and Analytics in Social Science March 22, 2012 [cited 31 August 2013. Available from http://computationalmodelingblogs.stanford.edu/winter2012/2012/03/22/agent-based-modeling-of-peer-effects-a-study-of-the-impact-of-classroom-composition-on-the-achievement-gap/.

McCallum, D., and J. Lowery. 2006. *Organic disciplemaking: Mentoring others into spiritual maturity and leadership*. Houston, TX: Touch.

Means, B. 2006. Prospects for transforming schools with technology-supported assessment. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 18845-19435. Cambridge; New York: Cambridge University Press.

Metzler, T., A. Beyers, and J. Goulden. 2004. Overcoming obstacles in religion-and-science dialogue with an agent-based computer simulation tool. In *Science and Religion in Context: An International, Interfaith, and Interdisciplinary Conference*. Philadelphia, PA.

O'Connell, T. E. 1998. *Making disciples: A handbook of christian moral formation*. New York: Crossroad.

Pea, R. D., and H. Maldonado. 2006. Wild for learning: Interacting through new computing devices anytime, anywhere. In *The cambridge handbook of the learning sciences*, ed. R.

K. Sawyer, Kindle Locations 15755-16380. Cambridge; New York: Cambridge University Press.

Quintana, C., N. Shin, C. Norris, and E. Soloway. 2006. Learner-centered design: Reflections on the past and directions for the future. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, 5090-5671. Cambridge; New York: Cambridge University Press.

Richey, R. C., J. D. Klein, and M. W. Tracey. 2011. *The instructional design knowledge base: Theory, research, and practice*. Kindle ed. New York, NY: Taylor and Francis.

Rouse, W. B., and K. R. Boff, eds. 2005. *Organizational simulation*. Hoboken, NJ: John Wiley & Sons.

Sawyer, R. K. 2006. Conclusion: The schools of the future. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 21303-21840. Cambridge; New York: Cambridge University Press.

_____. 2006. Introduction: The new science of learning. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 484-1154. Cambridge; New York: Cambridge University Press.

Schofield, J. W. 2006. Internet use in schools: Promise and problems. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 19438-20012. Cambridge; New York: Cambridge University Press.

Stahl, G., T. Koschmann, and D. D. Suthers. 2006. Computer-supported collaborative learning. In *The cambridge handbook of the learning sciences*, ed. R. K. Sawyer, Kindle Locations 15049-15753. Cambridge; New York: Cambridge University Press.

Sun, R., ed. 2008. *The cambridge handbook of computational psychology*. New York, NY: Cambridge University Press.

Takahashi, S., D. Sallach, and J. Rouchier, eds. 2007. *Advancing social simulation: The first world congress*. Tokyo: Springer.

Walker, E., N. Rummel, and K. Koedinger. In Press. Adaptive intelligent support to improve peer tutoring in algebra. *International Journal of Artificial Intelligence in Education*.

Wimberly, A. E. S., and E. L. Parker. 2002. In search of wisdom: Necessity and challenge. In *In search of wisdom: Faith formation in the black church*, ed. A. S. Wimberly and E. L. Parker, 11-21. Nashville: Abingdon.

Woolf, B. P. 2008. Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning. Burlington, MA: Elsevier Science.