Anchoring Online Learning in Real-World Contexts

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Contextual learning is critical to equip learners to apply knowledge and skills and to solve problems in the real world. The purpose of this article is to describe the collaborative effort of a subject matter expert and instructional designer to implement a situated cognition model to contextualize a fully online cardiac rehabilitation course. The implementation of the model resulted in the creation of an online learning environment that resembles the complexity of cardiac rehabilitation centers, where learners were able to solve a problem by articulating a cardiac rehabilitation plan for a client.

Introduction

Teaching cardiology rehabilitation (cardiac rehab) entails equipping learners to work in cardiac rehab centers with patients who have experienced cardiac events. This work starts as soon as a patient is referred for rehabilitation and continues until a plan is created, evaluated, and completed (Cardiac Care Network, 2014). To create a plan, healthcare professionals usually start working with patients while in the hospital, then

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after they are discharged, until they become outpatient and start health maintenance (which is a life-long commitment to lifestyle change and modification). In real life, this work is very complex. It requires interaction with clients, their families, and the interprofessional team. It also requires solving the many complex issues that arise, to create the best possible plan for the patient considering their needs and preferences. Therefore, teaching a cardiac rehabilitation course, fully online, is especially challenging since it is necessary to transfer the complexities of real life into the online environment. It requires situating learning into meaningful contexts to mirror, as close as possible, the real-world environment and situations that learners will experience while working in the cardiac rehabilitation field.

Situated learning is founded in the belief that knowledge is situated in a context, and that knowing and doing cannot be separated because they intrinsically shape each other (Brown et al., 1989). The authors consider that knowing and doing both depend on the situation in which they are learned and therefore, learning and cognition are situated in a real-world context. Consequently, if we ignore the situated nature of cognition, we are defeating the purpose of providing learners with usable knowledge that can be applied in real life (Brown et al., 1996). Knowledge becomes usable when the learning context is similar to the performance context, which will allow learners to transfer their knowledge and skills to situations they will encounter in their professional life (Driscoll, 2005).

It has been well documented that when learners encounter, in real life, a situation like what they experienced in the learning environment, they tend to apply what they already know (Schank, 1982). Contextual learning connects content with real situations (Rizki & Arty, 2019). This connection involves using the content instead of remembering it, helping learners to make sense of the information (Almeida et al., 2015), and facilitating deep information processing, and knowledge construction (Kartikaningtyas et al., 2017). Contextual knowledge is especially important for Canadian colleges, whose focus is providing learners with the knowledge and skills needed in the marketplace.

Situated cognition emphasizes the importance of context and participation of learners in the process of knowledge construction to reuse it (Brown et al., 1989). According to Schank, 1992, when knowledge is stored, it is indexed in the situation in which it was used and therefore, when knowledge is needed, learners will retrieve it from the index and apply what they have learned in that situation to a new or similar one. The author posits that real-life situations are complex, and that learning should reflect such complexities as best as can be constructed in the online learning environment. According to Nurvitasari et al. (2019), authentic situations seldom take place in isolation; they involve active participation of different actors. Therefore, according to the author, creating authentic situations for learning represents a challenge for educators, it requires switching the teaching from short-term remembering to problem-oriented experiences, geared to mastering the materials and related competencies in a way that equip learners to solve problems in long-term life situations. According to Brilingaite et al. (2018), a problem-oriented approach implies that the situations learners are exposed to are complex and ill structured, just like in real life, and cannot be solved by a simple algorithm. They go beyond rote learning and require more critical thinking and reflection, application, synthesis, and evaluation of knowledge.

When teaching online, bridging the real world to the online environment is even more challenging for educators. However, the increasing availability of technology tools, in the last few years, is allowing educators to create complex contextual learn-

ing in the online environment, displaying real world attributes (Westera, 2011). Also, the emergence of artificial intelligence (AI) is further creating new opportunities and possibilities for curricula and instructional design. The author argues that online learning does not need to take place in a vacuum; it can be connected to the real world so that learners can make sense of the facts, concepts, principles, and rules as they manifest in real life. This creates a bridge to the real world from the online learning environment. Creating instruction in a context requires placing each component of the instruction in authentic situations, thereby connecting knowledge and application (Yuvita et al., 2019).

Creating a contextualized online course requires a great deal of collaboration between instructional designer and the subject matter expert (SME) to reveal what really happens in real-world situations and the role learners will play in those situations when they join the work force. According to Schank (2002), learners will remember the role they played and when a similar situation arises in their professional life, they will apply what worked in that situation. Additionally, the author argues that if learners encounter a new situation, they adapt what they learned in past situations and apply it to the new context.

McLellan (1996) considers that the view of learning as situated has important implications for the design of instructional experiences since it entails presenting information in authentic contexts and

Figure 1. Situated learning model implemented (based on Brown et al., 1989).

keeping knowing and doing intrinsically related. According to the author, the key components of the situated learning model, introduced by Brown et al. in 1989, are stories, reflection, collaboration, coaching, multiple practice opportunities, articulation of learning skills, and utilizing integrative technologies (Figure 1).

The purpose of this article is to describe the process followed to create a contextualized and fully online cardiac rehabilitation course. To create the course, SME and instructional designer first analyzed the audience, the context, and the content; then based on their analysis, the team designed the course using key components of the situated learning model: stories, reflection, collaboration, coaching, multiple practice, articulation, and technology.

Analysis

The cardiac rehabilitation course is part of a cardiology certificate, the third course of the certificate out of four, and it builds upon the previous courses. To start the design process, the team analyzed the learners, the performance context, the National Canadian Cardiac Rehabilitation Competencies, and the outcomes of the course. Learners were postdegree (or diploma) professionals, registered health professionals, including nurses, occupational therapists, and pharmacists. They were already working in their field of knowledge and wanted to get into the cardiac rehabilitation field, to upgrade their skills, or refresh their skills. However, it is important to note that while some of the learners might have taken the two previous courses of the certificate, as part of the full certificate, others might not since they might be just taking this individual course as part of their professional development or personal learning plan or to update their skills. Therefore, learners had different levels of prior knowledge, which the design team needed to be aware of to address gaps.

The instructional designer and SME also analyzed the performance context, to determine the work health care professionals do in cardiac rehabilitation centers. This work involves working collaboratively with other interprofessional teams to implement the four phases of the cardiac rehab process: acute, subacute, outpatient, and maintenance. Additionally, the work in cardiac rehabilitation centers involves following the five national standards: Referral, intake, evaluation, rehabilitation, and management, established by the Ministry of Health and Long-Term Care of Canada (Cardiac Care Network, 2014).

The work in a cardiac rehabilitation center is complex and therefore, the overall goal established for the course was to create a rehabilitation plan for a patient who had a cardiac event. To reach the goal, learners needed to analyze, synthesize, and evaluate information. Consequently, considering the goal, the phases of the cardiac rehab process, the standards, and the characteristics of the audience, it was necessary to create a learning context, as close as possible to the one they would find in the workplace. Therefore, a story was created to contextualize the learning experience.

Design

To reach the proposed goal, the team created a fully online course that can be visualized as two main components: the first component named before you start, contains preinstructional information necessary to familiarize learners with the course and its approach (the context). This component starts by explaining to learners the knowledge and skills that they will acquire in the course. It also explains that they will participate in a 6-week learning experience that would allow them to interact with their fellow cardiac rehab colleagues (classmates) to share ideas and participate in weekly cardiac rehab patient related activities. It also explained the aim of the course

to provide learners with an immersive experience of the world of what cardiac rehab means and entails, and what it may look like in our cardiac rehab care facilities.

The second component, learning materials, is comprised of six modules. In Week 1, learners dive into the basics of the cardiac rehab process. What is cardiac rehab, the five cardiac rehab standards that govern the practice of cardiovascular rehabilitation, who is a candidate for cardiac rehab and who is not. This information was considered important to help learners to develop an appreciation for how important it is to have a basic understanding of the cardiac rehab process and the standards that guide their practice. In Week 2 through 5, learners look at Step 1 through 4 of the cardiac rehabilitation, considering the national standards. In these modules, learners apply the core concepts of each step to a simulated cardiac rehab patient, which gives them the beginning insights and awareness into their role as a member of the cardiac rehab care team as well as the other members' role. These modules also help learners to look closer at their role during the different steps in the four phases of cardiac rehabilitation. In Week 6, the final week of the experience, learners articulated their consolidated learning by preparing a group presentation, with the outcome being a "Cardiac Rehab Plan of Care" for the patient introduced in Week 1. The aim of the learning modules was to focus on the application of the core cardiac rehab principles as it relates to providing care. Therefore, the weekly learning modules were built around the key components of the situated learning model: stories, reflection, collaboration, coaching, multiple practice, articulation, and technology, which are described below.

The Story

Stories are a central component of the situated learning model. They help learners make sense of complex information, make connections between different elements, and construct a mental framework of the topic (Rogoff, 1995). Stories also help to create a pleasant and motivating learning environment because people have a natural ability to make sense of the world around them through stories (Jonassen, 2002). For this course, the story created progressed every week, based on the learning topics for the week. So, each week the learner is building on their previous knowledge and understanding from the previous week. The story was based on a real-life event.

The purpose of the story was to create a context as close as possible to one of a real rehab center that promoted analysis, synthesis, and evaluation, and facilitated the application of knowledge and skills. The intent was to let the story drive the learning and have learners learn content while solving issues that arise while working with Rowan in the rehab center. The story presents challenging situations that learners needed to address, and which would lead to the creation of a cardiac rehabilitation plan for the client. The story was presented in a multimedia format, using an animation software, Vyond. It progressed through the course, stimulating discussion, conflict, and research to engage learners. According to Mattar (2018), real problems or challenging situations do not usually come in textbooks and, therefore, it is the responsibility of educators to embed authentic situations or scenarios in the online learning environment. The use of authentic scenarios shifts the focus from teacher-centered to problem-centered instruction, which goes beyond rote learning and mere remembering content. According to Nurvitasari et al. (2019), remembering content will not help learners put into practice what they know when they get into their professional life. This is why an integrative approach was taken with the design and development of this course.

The story started in the first module of the course; it starts by explaining cardiology nurse/health care professional working in the cardiac rehabilitation (learners), which they will need to create a cardiac rehabilitation plan for a new client (patient) who has been admitted to the rehab center. It explains that the client is a 61-year-old woman named Rowan Roserio. She had open-heart surgery after a massive heart attack (Figure 2).

Before the surgery, she worked as logistics manager of one of the main supermarket chains in the Greater Toronto Area (GTA). She had been working under tremendous stress requiring long work hours to maintain the supply chain of products for the supermarkets in the surrounding areas. The scenario is couched in 2020 during the height of the pandemic. She has been sitting at her desk for months working long grueling hours (Figure 3).

She hardly has any time for herself, let alone to exercise; as a result, she has not been getting regular exercise. Rowan has also been eating fast foods and has been relying heavily on Uber Eats and Door Dash for most of her meals, since she is so busy with the demands of her job (Figure 4). Rowan is under a tremendous amount of stress and often ends the night with a couple glasses of wine and goes to bed only to get up the next day to do it all over again.

The story continues and explains how the client had a massive heart attack and was admitted to the hospital where she had emergency surgery. After surgery, the cardiologist determined that she is a good candidate for cardiac rehab (Figure 5). They think that cardiac rehab will be of significant benefit to her recovery and overall health promotion.

The story continues in subsequent modules which address the intake procedure, outpatient therapy, all the way to the long-term management phase of the CR process. To engage learners in the story and the content in the learning modules, the team provided means for reflection, collaboration, and offered support and practice opportunities to help learners articulate their final project.

Reflection

Reflection refers to the exploration of experiences to gain a deep understanding (Boud et al., 1985). It can be considered a

Figure 2. Rowan's heart attack.

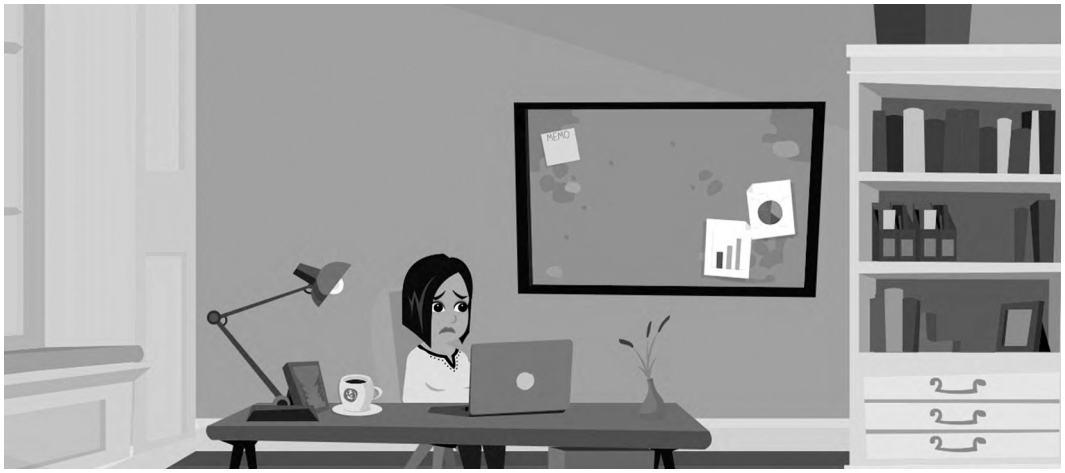

Figure 3. Rowan working under stress.

Figure 4. Rowan eating fast foods.

bridge that connects experiences and gives meaning to them (Rodgers, 2002). In other words, it means transforming experiences into meaningful learning (Cavilla, 2017). Therefore, reflection is a way to give learners the opportunity to transform information and generate deeper analysis (Sablić et al., 2021). According to McCormick et al. (2013), reflection promotes engagement of learners with instructional materials and allows application of knowledge and skills. When opportunities for reflection are part of the online learning content, learners are encouraged to take more responsibility for their learning, allowing them to engage in cognition and metacognition, helping them to function effectively with the increasing complex realities of work, leading them to become lifelong learners (Syazana et al., 2020). The author considers that as we get ready for the wide availability of artificial intelligence tools, educators

Figure 5. Rowan is a candidate for cardiac rehabilitation.

need to provide opportunities for learners to acquire life skills and motivate them to pursue and apply knowledge. Integrating opportunities for learners to engage in personal reflection not only allows for application of knowledge, but for synthesis and evaluation of that knowledge. This goes beyond generic AI generated content as they are challenged to integrate the content into their personal worldview and value system.

Reflection involves exploring an experience and remodeling what occurred to identify issues, connect components, and ultimately, own knowledge (Driscoll, 2005). We engage learners in reflection by creating, at the end of every module, a reflection component and inserting questions to reflect on the story and connect the story with the related phase of the rehab process and the related standards. This allows students to think critically about the information they need to create a rehabilitation plan for the client. These are examples of reflection opportunities that the team inserted in the learning modules:

- Rowan is out of surgery: What additional information would you want to obtain from Rowan about her health history?
- What invasive and noninvasive tests and blood studies would have been performed on her?
- What physical exam would you conduct to establish baseline data about Rowan at this time?
- Based on Rowan's initial intake appointment and assessment, what are some variables that should be taken into consideration as Rowan starts phase two of her cardiac rehab journey?
- What are the impacts of anatomy and physiology on the cardiac rehab process?
- Based on what you know about Rowan and her situation, what educational topics would you focus on for Rowan during phase one of the CR process?

Collaboration

Collaboration can be defined as working together in small groups to maximize individual and collective learning (Johnson et al., 1994). Therefore, the work of learners in small groups is encouraged throughout the course. One strategy to engage them in collaborative learning is collective problem solving (Brown et al., 1989). In this course, learners were given a problem that they needed to solve in small groups. In

these groups, learners play the roles of cardiology care provider working in a cardiac rehabilitation center. As part of their responsibilities along with a group of their colleagues, they need to create a rehabilitation plan for a new client who has been admitted to the rehab center following a cardiac event. Another opportunity for collaboration offered to learners was a Weekly Rehab Round Tables *(Discussion Board).* In these round tables events, learners had the opportunity to collaborate and interreact with their colleagues (classmates) to share ideas and participate in weekly patient discussions, which mimic real-world patient rounds scenarios. These questions include:

- How can you and the members of the CR team support Rowan and her family at this time?
- What supports would help the family adjust and adapt to the new reality they are facing?
- Explain why you feel it is important as members of the CR Team to take the client and family's lived experience into consideration during the CR process?

This allows learners to hone their critical thinking skills in a real way. Another means for collaboration created in the course was a cardiac rehab team lounge. This is a place where learners can engage and interact with their fellow cardiac rehab colleagues and collaborate with each other's, sharing resources, links or just chat with one another in a more informal manner. So built into the very nature of the course, there were opportunities for both formal, time on task learning, as well as more informal, personal opportunities to interact and engage with each other.

Coaching

In the context of situated learning, coaching refers to providing support and guidance to learners to help them reach their goals (Brown et al., 1996). In this course, support to learners translated into providing guidance and assistance in relation to several aspects such as navigating the course materials. For this purpose, a "before you start" section was created to provide preliminary information about the course and help learners to anticipate and mentally prepare for the expectations. This section explained to learners that to make the 6-weeks online learning experience an immersive experience into the world of what cardiac rehab means and entails, and what it may look like in our care facilities, they would be using a case scenario based on a real-life story, and that each week would build on the other as the patient moves through the phases of the rehabilitation. This component also offered a snapshot of the four steps and phases of cardiac rehabilitation process so that learners could anticipate their role in the course. Additionally, a *resource room* component was created to offer resources from around the web, which would be very handy to start exploring the resources about the different aspects of the cardiac rehab process. The idea was to help them dive into the many resources available so that when they started their group project, they would have already begun the search for additional resources. All the resources offered were organized on a weekly basis to match the topic of the different weeks. This was done intentionally to help facilitate and organize the resources in a meaningful manner conducive to learning and the overall experience.

To guide learners and offer clarification on different topics, a *course questions/comments* was created where learners could post questions and receive feedback from peers and faculty. The involvement of peers was meant to create a safe space for learners, where they could ask and answer questions, explain and offer explanations for concepts that might not be clear to some, offer and receive feedback, and recommend and request additional resources to enhance their understanding of the

topic. Many times, learners refrain from asking questions of professors, thinking that they should know the answers to what they are asking. However, when they know that they can ask questions to their peers, they tend to focus on asking what they need, instead of to whom they are asking the question. Therefore, participation is much authentic, active, and rich, which complements the learning experience.

Additional support was offered to learners in each one of the learning modules through a *before you begin* and *warm-up components*. The before you begin component was intended to leverage prior knowledge as this course is built from previous foundational courses, and not all learners might have taken the previous courses. Each week learners were given key cardiac rehab resources, which were web links to visit, articles to read, and materials from the previous course to visit or revisit. The warm-up component aimed to prepare learners for the module content. Its purpose was to apply concepts from the previous module and make the bridge to connect prior knowledge and experience of previous modules with the content of the new module.

Another way to support learners with the story was a component created at the end of each module called "What Happens Next?" In this component, we provided a preview of what would happen to Rowan in the next module. The purpose of this component was to help learners connect the components of the story and to create a sense of anticipation and motivation for the next module. Additionally, the instructor was available through offices hours and email to support and guide individuals and groups.

Multiple Practice

Multiple practice can be considered an instructional strategy geared to provide learners with multiple opportunities to practice and apply knowledge and skills (Dunlosky et al., 2013; Mayer, 2008). In this course, opportunities for multiple practice were offered through inserted short quizzes of one to four questions throughout the learning modules. The purpose of the questions was to focus learners on the main ideas of the content and promote going back to content and the story for review and clarification, if necessary. For example, some of the questions embedded in short quizzes were:

- Why do you think Rowans is suitable for cardiac rehab? What are the contraindications of Rowan for cardiac rehab?
- Based on Rowan's initial intake appointment and assessment, what are some variables that should be taken into consideration as Rowan starts phase two of her cardiac rehab journey?

The questions also help learners test for overall understanding of the content before moving forward. Additionally, questions were meant to stimulate prior knowledge and make learners think about a topic critically. For example, some of the questions intended to make learners think critically were:

- What health behavior changes will Rowan need to make and what education will she require?
- What cardiovascular risk factors do we need to focus on for Rowan?
- What cardioprotective therapies may help as Rowan is on the road to recovery?

Another means to practice were embedded tasks called "try it." These tasks involved learners doing something. For example, in module one, learners needed to identify what prospective employers are looking for when hiring a cardiac rehab nurse. The purpose of this type of task was to give learners insight into the complexities of the role. As well, there was an

opportunity to evaluate their own level of knowledge, skills, and qualifications for roles, and self-identify any gaps in their own knowledge base and skill set.

The practice activities provided in the course have as a common characteristic involving learners action that would generate confidence when working in real-life rehab centers.

Articulation

In the context of the situated cognition model, articulation refers to the process by which learners make their knowledge explicit by sharing with others their understanding of a particular task or solution of a problem (Brown et al., 1989). According to Jonassen and Rohrer-Murphy (1999), articulating a solution to a problem in a group setting involves negotiating meaning, collaborating with each other, and collectively constructing new knowledge within the group. In this course, to articulate the understanding of the cardiac rehabilitation process, learners needed to create a rehab plan for a client. For this purpose, the course was structured in a way so that learners needed to form groups of four to five people, during the first week of class. They needed to self-enroll in one of the groups created by the professor, and once they did that, they would have the space and tools within the learning management system to meet and collaborate with one another. Learners would need to start working on the rehab plan in Week 1, and work through each of the stages of the cardiac rehab process through Week 6 when they had a final virtual presentation to present their plan. The plan needed to incorporate the four phases which entails: (1) acute, which begins in the hospital, after the cardiac event i.e. a heart attack; (2) subacute, which begins when the patient is discharged, it is the pre-exercise period; (3) outpatient, which begins when the patient is out of the hospital and it involves intensive outpatient therapy and full cardiac rehabilitation program; (4) maintenance, which involves independent ongoing conditioning and heart healthy lifestyle. Additionally, the work in cardiac rehabilitation centers involves following five standards: Referral, intake, evaluation, rehabilitation, and management, established by the Ministry of Health and Long-Term Care of Canada (Cardiac Care Network, 2014).

To help learners to work on the rehabilitation plan, each weekly learning module focused on a specific phase and standard of the cardiac rehabilitation process. For example, in Week 1 we looked at the definition of cardiac rehab, indications and referral eligibility, the standards for cardiac rehab in Ontario, as well as the core competencies, and the roles and responsibility of the interprofessional team. Additionally, in this first week, learners were introduced to the client. In Week 2, we looked at the cardiac rehab intake procedure, the anatomy and physiology of the cardiovascular system, as it relates to cardiac conditions (heart attack), and the first phase of the process (the acute). The subsequent weeks learners looked at the other phases, the standards and the topics that should be addressed in a CR program, and the core focus and goals and the roles and responsibilities of the IP team. Learners also continued to follow Rowan through her journey. The intent was to use the CR standards and competencies to frame the content. This way the content was presented in both an integrative and applied way that reflects the thinking required for the workplace. Too often a course can separate the content from the process of how to use, integrate, and think about the content.

Discussion and Future Work

This paper describes the implementation of the situated cognition learning model to create a fully online cardiac rehabilitation course. We started by analyzing the target audience, which was followed with by the

design of the main components of the course, along with the key components of the situated learning model, which included stories, reflection, collaboration, coaching, multiple practice, and technology. The central component of the model is the story; therefore, we created an animated story, based on a real-life situation. Using this story-based model provided the anchor for the curriculum design, content creation and instructional design processes.

As future work, based on this experience, we expect to use this model again to create other nursing courses, but revamping the story using real people instead of animated characters. This will create more realism to the story. We plan to also explore the role artificial intelligence can play in our process, specifically, in the design of real-world learning activities and tasks. Additionally, we intend to measure the effectiveness of the course from the points of view of instructors and learners. From instructors, we would like to know if learners had any issues while going through the course, what instructors think might have caused the issues, based on the issues, what suggestions to make changes/improvements to overcome the issues, and finally, what are their justification for making changes. From learners' perspective, we would like to find out if the level of difficulty was appropriate for them, if the structure was intuitive and easy to follow, if the resources available were useful, if the content and resources supported the application of knowledge and skills, if the course supported the creation of the rehabilitation plan, and if the discussion board was useful and interesting.

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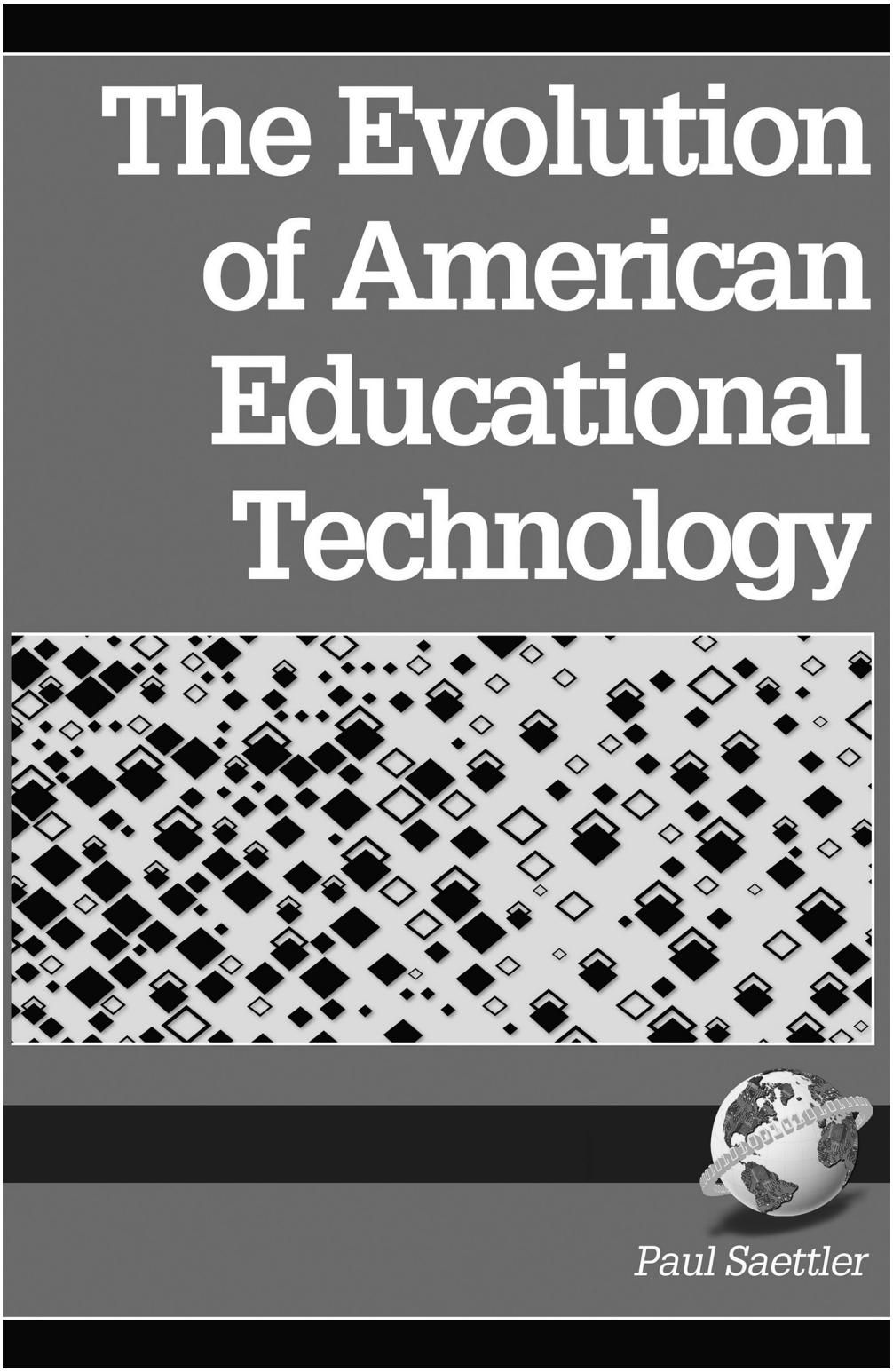

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