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ARTICLE

Collaborative Wikis as Final Exams

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ABSTRACT

In an age where we, our students, and our educational institutions value the distinctive benefits of collaborative learning and the new possibilities of digital resources, collaborative wikis hold promise for deeper and more integrative kinds of learning than individualized assessment tools focused on retention of information. Especially in settings where community formation and collective construction of knowledge are valued, wikis offer many advantages: they nurture more integrative forms of learning; they foster constructive collaboration with peers; they tap into digital resources that are inexpensive and readily available; they work well for both synchronous and asynchronous learners; and they engage different kinds of learners in more dynamic ways, provoking less stress than many quizzes and exams. Collaborative wikis deliver more than simply final products for assessment—they offer a process of learning that entails listening, integrating, and teamwork in ways that can have a more enduring impact. Without neglecting the needs of formative assessment, collaborative wikis are constructive tools for reviewing course material and fostering deeper forms of learning.

KEYWORDS

wiki, collaborative, collaborative learning, active learning, online education, exam, group discussion

I like traditional, closed-book, individualized final exams. I really do.[1] For instructors, comprehensive final exams are cumulative, often easy to assess, and focused on individual learning and retention. They have also been central to how I learned and was trained. But over years of teaching, I have come to the realization these kinds of comprehensive exams may not be the best strategy for assessing deep and integrative learning—at the very least for my discipline (biblical interpretation) and my particular teaching context (a medium-sized theological seminary that values community formation).

1 I am indebted to the Academic Teaching and Biblical Studies section at SBL/AAR in November 2019 in San Diego, CA, for their constructive feedback on this essay at the 2019 session "The Digital Debate: Pros and Cons of Technology in the Classroom."

In my experience, many students face significant anxiety and stress around quizzes and exams that focus on retained information. Many others struggle with motivation, seeing less relevance or constructive significance in an exam (rightly or wrongly) for formative learning. Finally, some learners face greater challenges with assessments based largely on individualized retention of subject matter. As an example, a student from my first semester teaching comes to my mind: he had documented learning challenges, came from an underprivileged educational background, and had failed the course the last time around. He was intelligent and verbally articulate in many ways, but he regularly floundered in courses that assessed his learning primarily through forms of individualized memory recall. No one who encountered him thought him unintelligent in any way. It just seemed that our conventional forms of assessment neither gauged his intelligence nor fostered holistic learning for him appropriately.

Figure 1. *Wikipedia Monument by Mihran Hakobyan (Slubice, Poland) (Courtesy of Wikipedia)*

In many of our teaching contexts today, we place increasing value on things beyond simple mastery of information. We may value things like listening, original thinking, integration of learning, active learning models, cross-cultural sensitivity, use of digital resources, oral communication, leadership skills, and collaborative teamwork. After all, these are the very kinds of competencies needed by learners to function effectively in professional careers (NACE 2019; Laal and Ghodsi 2012; O'Donnell and Hmelo-Silver 2013). Many of us orient some of our student learning outcomes around these values and competencies. Even for those of us who teach in academic disciplines and contexts that emphasize mastering information, strategies for collaboration and shared leadership are desirable skills. As Lynn Wilson points out, "The call to collaborate is everywhere you look. Whether you or your students see it as a difficult but necessary element or embrace collaboration as an advanced way to solve problems, it is central to almost any professional endeavor" (Salmons 2019, foreword). In addition, we all teach, learn, and live in an increasingly connected world where digital resources offer distinctive new opportunities for collaboration and shared learning. This landscape only encourages us, as teachers, to employ and experiment with learning approaches that are more interactive, collaborative, and connected (Zhang 2013; Loewen, Lester, and Duncanson-Hales 2014).

In environments that prioritize learning outcomes beyond mastering information, collaborative wikis hold promise for nurturing deeper, more integrative, and more holistic forms of learning. As one of my students observed, the learning experience of a collaborative wiki was more than a means toward a polished product—it was an educational process that entailed listening, integrating, and teamwork in ways that yielded a more enduring impact. Although they come with particular challenges that make them less optimal for some teaching contexts, wikis foster and encourage collaborative learning and digital literacy in ways that many educational settings and instructors highly value.

Collaborative Learning in Perspective

Collaborative learning is more than simply learning together. It is learning by working together with others, hearing their perspectives, integrating their insights, and sharing in a collaborative endeavor toward a constructive new purpose (Kuh 2008, 10; Gale 2016, 17; cf. de Arriba 2017, 365). Educational research continues to emphasize the distinctive benefits of collaborative learning models, assignments, and tools: they tend to foster higher levels of thinking, oral communication, and leadership skills; they promote more student-learner and peer-to-peer interaction; they expose learners to a greater diversity of perspectives; they promote higher self-esteem and lessen learner anxiety; and they generally increase learner retention and responsibility (Laal and Ghodsi 2012; O'Donnell and Hmelo-Silver 2013; Sawyer 2019, 42–44). As these benefits suggest, the process of collaborative engagement typically enriches and enhances the learning experience, whether or not this translates into better performances on individualized student assessments that focus on mastery of information.

Collaborative learning, after all, is not necessarily a superior approach to education—it simply prioritizes different student learning outcomes. In *The Creative Classroom*, Keith Sawyer (2019) points out that research on the benefits of collaborative classroom conversation shows mixed findings. Some studies show that collaborative small group discussion enhances learning, while other studies show no clear evidence that it does. But more recent research sheds light on this apparent inconsistency, which stems from the learning outcomes that are prioritized.

In learning environments where mastering and information is the backbone and reproducing it later is the goal (what Sawyer calls "shallow knowledge" [2019, 13]), collaborative small group discussion may or may not help. After all, the learning goals deal with individualized recall of information, which small group discussion may or may not help. But in learning environments characterized by more dynamic and holistic forms of engagement, collaborative group discussion tends to help learners with processing and owning ideas (what Sawyer calls "deep knowledge" [2019, 5]) in ways that foster integration (Pai, Sears, and Maeda 2015; Sawyer 2019, 44; Manion and Alexander 1997). In short, collaborative small group discussion does not enhance all kinds of learning, but it certainly does a certain kind of learning—one more focused on integration and ownership.

As this research suggests, the distinctive benefits of collaborative learning may not be measurable by individualized forms of assessment. Gerry Stahl makes this point, arguing that collaborative learning's benefits are not necessarily reducible to or measured effectively by individual learning outcomes (Stahl 2010). Collaborative forms of learning, it seems, deserve their own sets of outcomes. This does not mean collaborative group work is irrelevant to individual outcomes. It just means collaborative learning yields outcomes that may not translate precisely to outcomes prioritized by more individualized approaches.

Janet Salmons draws a distinction between collaborative and cooperative learning, even though many experts use the two notions synonymously. She describes cooperative learning as merely a division of labor among participants, where each is responsible for a portion of the project. Collaborative learning, however, involves a reciprocal engagement by learners in a coordinated effort to solve the problem together (Salmons 2019, 6; Roschelle and Teasley 1995, 70). The distinction here is whether learners have the autonomy to make their own decisions about the process, roles, leadership, and approaches to problem-solving. In cooperative learning, the course instructor decides these things, giving little decision-making authority to learners.

Salmons further fleshes out some specific forms of collaborative learning in what she calls a "Taxonomy of Collaboration." She places forms along a spectrum of "synergy," ranging from those that require very little trust and shared work to those that entail high levels of trust and working together. She identifies six forms on this spectrum:

- **Reflection**: Individuals align their own knowledge, attitudes, and skills with group efforts. Individuals make sense of and prepare for roles in collaborative efforts.
- **Dialogue**: Participants agree on group expectations, timelines, processes, and tools. They exchange ideas to find shared purpose and coherence with the tactics needed.
- **Review**: Participants exchange constructive mutual critique and incorporate others' perspectives. They evaluate which elements to include and how to integrate them.
- **Parallel Collaboration**: Participants work to each complete a component of the project. Elements are combined into a collective final product.
- **Sequential Collaboration**: Participants complete stages of the work, building on each other's contributions in progressive steps. All are combined into a collective final product.
- **Synergistic Collaboration**: Participants synthesize their ideas to plan, organize, and complete a product that melds all contributions into a collective final product. (Salmon 2019, 3-23)

As the forms progress, they advance from forms that reflect limited synergy and require little trust (like Reflection) toward forms that reflect high levels of synergy and expect high levels of mutual trust (like Synergistic Collaboration). Each specific form may advance or lead to other forms that entail higher levels of synergy and trust (Salmons 2019, 12–13).

Seen through this spectrum, I find that collaborative wikis often require and foster high levels of trust and synergy. Not only do wikis require reflection and dialogue, but they also expect review and parallel collaboration. And in many cases, where learners take moderate risks of vulnerability, sequential and synergistic collaboration take place. In short, collaborative wikis expect and encourage high levels of mutual trust and synergy.

What is a Wiki?

A Wiki is a "web-based tool (or website) collaboratively created by multiple users, where each user can typically add/delete/modify content directly" (Kurt 2017; Malamed 2019).[2] It is not wedded to a specific program (like Wikispaces), but does use the internet to allow two or more people to construct together a body of information by a process of creating and editing pages. The most famous example, of course, is Wikipedia—an online, collaborative encyclopedia that hosts more than forty million articles in over three hundred languages and boasts approximately half a billion visitors per month (Wikipedia).[3] Other well-known examples are WikiHow, Wiktionary, and Open Street Map, just to name a few.

Wikis have become popular especially in the last ten to fifteen years, buoyed along by major online hubs like Wikipedia, Wikispaces, and Wikia. By many standards, the popularity of wikis may have peaked around five years ago—when Wikipedia contributions were at their peak, and Wikispaces was still in its prime. Since then, Wikispaces has dissolved, while Wikipedia continues to have widespread use despite a slight decline in contributions and views.

Still, despite some shifts in the programs that are widely used, the fundamental principle of wikis—collaborative creation using technology—is hardly in decline. If anything, the practice has shifted from being simply a buzzword or new fad to becoming a staple tool among other technology resources for teaching in a digital age.

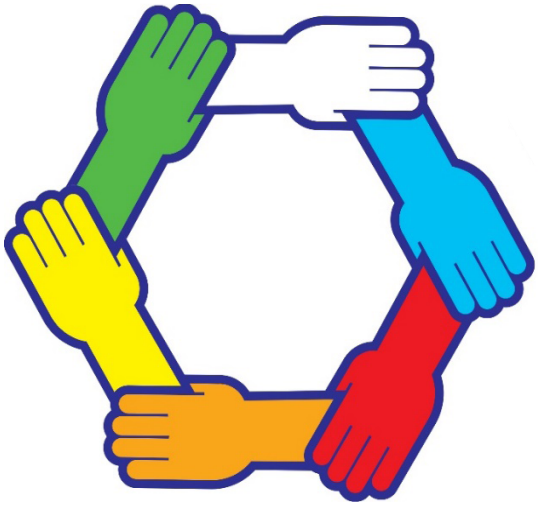
2 This definition is based on both Serhat Kurt's (2017) and Connie Malamed's (2019) definitions. Kurt borrows from Franklin and Van Harmelen (2007, 5).
3 Of course, since this data is self-reported, it may be that the numbers are inflated.

There are many free and user-friendly wiki sites available. For example:

- **Confluence:** Well-known wiki software for the enterprise
- **DokuWiki:** Specializes in managing documentation
- **EditMe:** Low-cost platform for business or classrooms
- **Mediawiki:** Free software engine used for Wikipedia
- **MS Teams Wiki:** If you are using MS Teams, you can create a wiki tab
- **Nuclino:** A modern wiki branded as a "collective brain"
- **TikiWiki:** Open source and free wiki software
- **Wiki.js:** Open-source wiki software[4]

In addition, Wikimatrix.org has an online comparison tool that compares selections from around two dozen online Wiki sites (or programs) and identifies the perks of each. It is a great tool for narrowing in on the most desirable program. I have also used Google Docs as platforms for several wikis in my courses—including the example I share below—and it has been effective for my purposes.

Figure 2. *Helping Hands (Vector Stock Image)*



An Example Case Study

In this section, I present an example of a collaborative wiki used as a major assignment in one of my courses. It illustrates many of the distinctive benefits and challenges of using collaborative wikis in teaching, both of which I will discuss afterward.

The course's institutional context is a medium-sized, mainline Protestant theological seminary. The seminary offers all its courses in various modes (asynchronous online, synchronous online, residential, residential intensive) to students,

4 Adapted from Malamed (2019). Wikispaces and Wikia used to be prominent online wiki resource sites, but they are both no longer operational.

three-quarters of whom are distance learners. Although the technology support is adequate (site support, hardware, web-conferencing, and video-recording program subscriptions), instructors typically must implement and manage their teaching technologies themselves.

In fall 2019 I taught an online course on the New Testament Gospels to a dozen distance students training for church ministry leadership. The students were evenly split male and female, all middle aged or older, spread out across the United States, and 75 percent white/Caucasian.[5] Two of the course's learning outcomes focused on reading and interpreting texts, which earlier assignments prioritized and evaluated on individual levels. Two other course learning outcomes focused on collaborative teamwork and integration of the course material. These foci served as intended outcomes for the collaborative wiki assignment.

For the assignment, I allocated students to small groups of three and tasked them with collaborating on a substantive, written presentation about each of the four Gospels. In two to three thousand words total, these collective presentations needed to describe the date, original audience, themes, theological emphases, distinctive traits, and major characteristics of each of the Gospels. I prescribed these categories as recommended areas to address. Aside from these recommendations, the assignment remained open-ended for each group to respond to as they saw fit. For the sake of consistency of submission, I set up separate, editable Google Documents for each team. I also set some basic ground rules for participation, asking that every member have equal voice in decision-making and equal share in contributing, with individualized tracking of their contributions in place as a measure of accountability. Finally, I used an online poll to schedule an hour of time for each group to start their collaboration with a synchronous, web-conferenced meeting (by Zoom). This was the first time any of the participants had done such an assignment. For some, it was the first time they came to understand what a "wiki" is.

I have used collaborative wikis as class activities in several courses, but this was the first time I used them as an evaluated, major assignment. There were several, immediate positive results.

- The students turned in better material. All the submissions rivaled what only the best students submitted in past years for a comparable assignment.

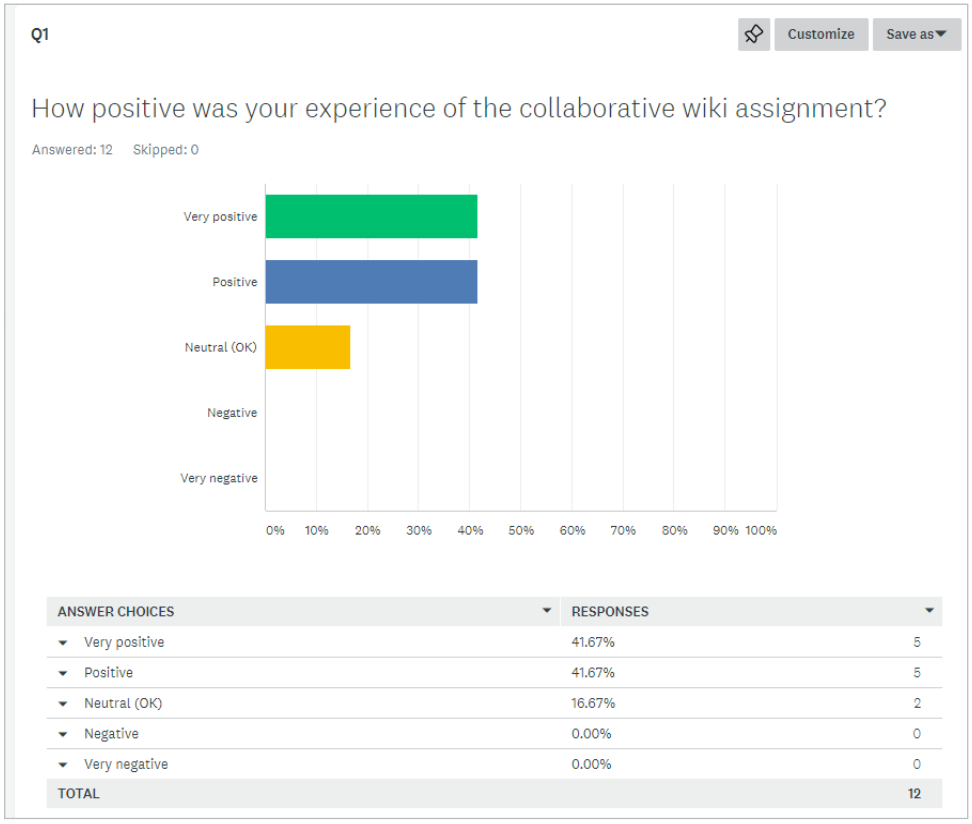
- The students had a positive learning experience (see Figure 3). Based on an anonymous poll I conducted (with a 100 percent return rate), over 83 percent of the students had a positive experience—with all other votes "neutral."

- Most of the students (58 percent) said they would prefer this kind of assignment over an individual paper (see Figure 4). Just 17 percent would not prefer it, and 25 percent voiced no strong opinion.

- Most interesting of all, a clear majority of students (near 70 percent) said they believed they learned more from the process of a collaborative wiki than they would have working individually (see Figure 5).[6]

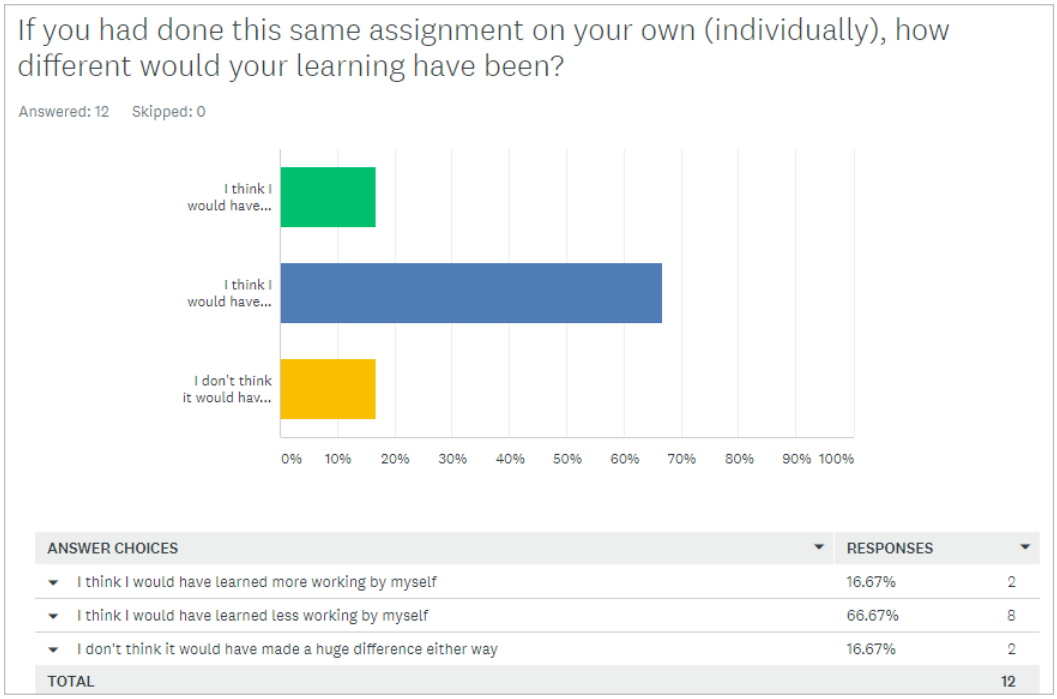
5 The remaining 25 percent were African-American (8.3 percent), Latinx (8.3 percent), and Native American (8.3 percent).
6 Seventeen percent believed they would have learned more from an individual paper, and another 17 percent had no strong opinion.

Figure 3. *Survey Results*



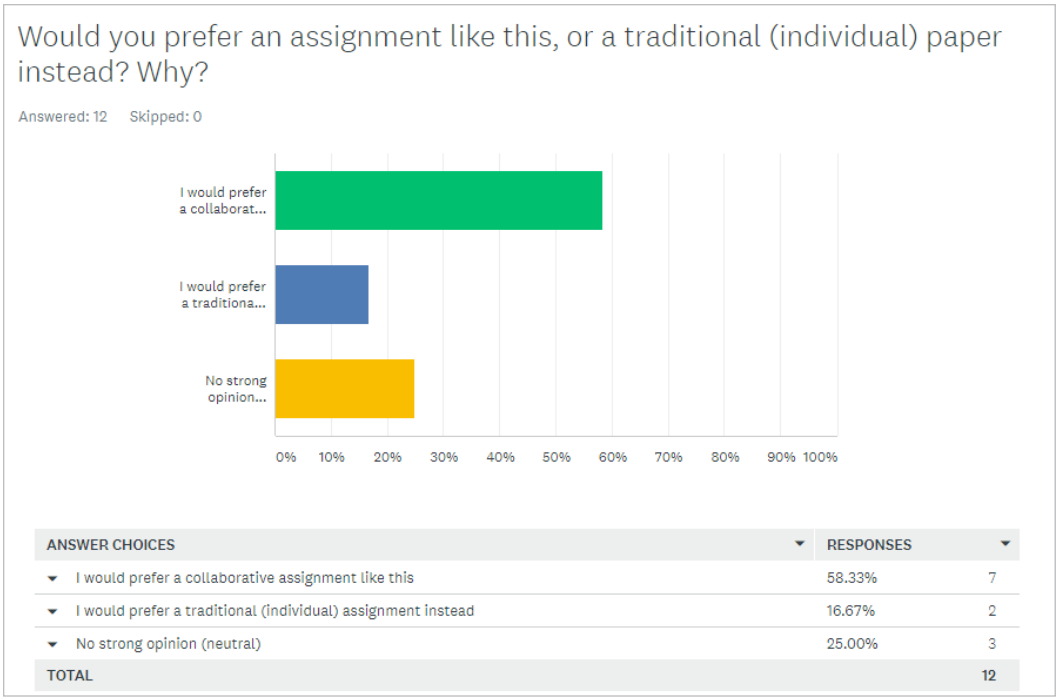
ANSWER CHOICES	RESPONSES	
Very positive	41.67%	5
Positive	41.67%	5
Neutral (OK)	16.67%	2
Negative	0.00%	0
Very negative	0.00%	0
TOTAL		12

Figure 4. *Survey Results*



ANSWER CHOICES	RESPONSES	
I think I would have learned more working by myself	16.67%	2
I think I would have learned less working by myself	66.67%	8
I don't think it would have made a huge difference either way	16.67%	2
TOTAL		12

Figure 5. *Survey Results*



ANSWER CHOICES	RESPONSES	
I would prefer a collaborative assignment like this	58.33%	7
I would prefer a traditional (individual) assignment instead	16.67%	2
No strong opinion (neutral)	25.00%	3
TOTAL		12

Clearly, most students enjoyed the experience of the assignment. Based on the unsolicited comments I received (in addition to the questions answered), the best part of this experience for learners was the process of dialogue and interactive engagement leading up to the assignment's submission. Most students found this process to be relationship-building, creativity-nurturing, and enhancing to integrated and authentic learning. In my observation, the assignment's collaborative work also bore greater potential for better integration. In prior forms of this class, I have conducted a similar assignment in an individualized format, and the collaborative submissions outshone the average quality of the individualized submissions I received in past years. My tracking of individualized student contributions showed some discrepancies (i.e., not all students contributed the same amount), which is a shortcoming of this assignment. However, all students contributed sufficiently—and at a higher level of integrated learning. As one student worded it, working in a "team offered more than the sum of its parts. When one [person] added something, it would trigger a new thought by another person." At the end of the day, the assignment addressed the two outcomes of teamwork and integration quite well.

Two clear shortcomings arose in conducting this assignment. The first, as mentioned above, is less individualized accountability. Like any group project, collaborative wikis place less emphasis on individual efforts. Not all my students found the collaborative wiki preferable to an individualized assignment (see Figures 4 and 5). My sense is the few who did not (two out of twelve) may have been "achievers," less situated to benefit academically from collaborating with others. My students were aware that the wiki tracked their individual contributions, which only encouraged equal sharing of the participation (advocated by de Arriba [2016]). However, in my experience, multiple layers of editing make individualized tracking more convoluted than clear. As with any group assignment, it is more an ideal than a reality that all students have an equal hand in every area of the assignment.

The second shortcoming involved group dynamics that required attention. In one of the small groups, one class member communicated to me early on about a forceful group member who was supposedly dominating their group's conversation and work. I addressed the matter by reiterating our basic ground rules for group work to all the students, emphasizing how highly I valued (and would be looking for) equal distribution of the workload among members. Whether influenced by my follow-up or not, the concern did not persist. Based on a check-in I conducted, it seems that by subsequent group interactions, any differences and tensions had been overcome or sufficiently addressed. The student (mentioned above) later noted that their concern stemmed largely from a negative experience during the first Zoom meeting, centered largely

on differences in personalities (and modes of processing), and misunderstandings of each member's intentions. Still, this minor experience underscores the wisdom of other wiki-using instructors who point out that appropriate instructional support is a must for using wikis successfully (Cilliers 2017, 491–492; Zheng, Nijya, and Warschauer 2015).

Although only a small-scale case study, this example illustrates some of the benefits and shortcomings of using collaborative wikis as major assignments, both in my own experience and in the experiences of colleagues of mine.

Wikis: The Benefits

First, wikis require more integrative thought, active learning, creativity, and original writing than assignments which focus on mastering and reproducing information. As Tami Eggleston points out, "Wikis provide a vehicle for exercising most, if not all, of Bloom's 'higher order thinking' activities" (2011). Wikis foster what many studies call "deep knowledge" (vs. "shallow knowledge" or "surface learning") more deliberately and effectively (Sawyer 2019, 44; Laal and Ghodsi 2012, 489). As forms of collaborative learning, they also foster higher levels of thinking—like problem-solving skills, articulating opinions, integrating ideas, and responding to critique—than traditional forms of individualized learning (Laal and Ghodsi 2012, 488; Webb 1982). Finally, as forms of active learning, wikis have more potential to tap into innate interests of learners (Laal and Ghodsi 2012, 488). For learners in my teaching context—a theological school focused on training ministry leaders for diverse social settings—these outcomes are extremely valuable.

Second, wikis promote collaboration, which has a distinctive potential to foster more authentic forms of learning (Cilliers 2017, 489). Viewed through the lens of Janet Salmons's taxonomy of collaboration (discussed above), the experience of a wiki assignment in my course generated forms of collaboration best described as sequential collaboration—and in some cases, synergistic collaboration. As one student shared, the final product was "greater than the sum of its parts," since the learners' shared work spurred one another on in mutually constructive ways. This not only has the potential to enhance productivity and achievement (Laal and Ghodsi 2012), it also promotes a constructive classroom environment—one that values and fosters an atmosphere of interactive learning and communal dialogue. In short, this kind of collaboration sends a clear message: working well with others matters. In our evolving understanding of what significant learning is in the twenty-first century, this kind of atmosphere is important. Today we are increasingly aware that learning and formation are not just cognitive transactions—they involve holistic and interpersonal engagement with learning communities. As Jean Lave and Etienne Wenger point out: "Learning involves the whole person; it implies not only a relation to specific activities, but a relation to social communities—it implies becoming a full participant, a member, a kind of person" (1991, 53).

Third, wikis use technology in ways that promote digital literacy skills, and in ways that are often readily accessible and at no additional cost. Learners today work in an increasingly digital environment, where tools for collaboration across distance are becoming more and more necessary. Furthermore, learners in most settings are increasingly familiar with basic digital platforms and programs, making those who struggle to adapt a minority—though an important group nonetheless (Cilliers 2017, 489). As Nathan Loewen points out:

> The distribution of social-friendly devices is increasing, where simple and reliable tools are also fairly affordable. . . . The Internet is becoming more widely available around the world, too; and this is accompanied by a correlative increase in the potential for intercultural and regional awareness. I think it should be entirely possible [for us teachers then] to imagine teaching and learning that reflects the social dynamics that accompany these contextual changes. (Loewen, Lester, and Duncanson-Hales 2014, 7)

In a world that is "connected," the medium of our assignments becomes as important and instructive as their final products. For these very reasons, Chris Paris finds wikis especially beneficial for implementation in classroom settings:

> I highly recommend the use of wikis in the classroom. In fact, I believe they may be a better way to conduct research in the digital world. Our students no longer carry backpacks or briefcases full of articles. Their information is stored on laptops or tablets. While the data may be more easily accessed, it still needs the organization that a wiki can provide. (Paris 2014)

In short, collaborative wikis encourage and foster facility with digital literacy, in ways that are relevant, worthwhile, and practical.

Fourth, wikis work well for online and hybrid classrooms, as well as residential ones. Since the editing functions of wikis allow readily for collaboration across both distance and time, the tool works well for hybrid classrooms that involve both residential learners, synchronous distance learners, and asynchronous learners. What several of my asynchronous students valued the most about the assignment was the relationship-building that took place, after they were grouped with people they would not otherwise have engaged in such extended conversation. In learning environments that value collaborative problem-solving and leadership, this is a real gain (Cilliers 2017, 489). That said, wikis foster collaboration and relationship-building primarily in learning environments where these virtues are already prioritized, valued, and facilitated as part of the learning experience. As Karen Kear points out, "the nature of the learning is not inherent in the technology but is created through interaction between students, their peers, and teachers, and is related to the cultural context. . . . To put it another way, technology does not determine outcomes" (Kear et al. 2016, 16, 18). In other words, collaboration and relationship-building may be fostered by wikis, but those outcomes are determined to a larger degree by the classroom atmosphere, cultural contexts, and learning environment. Still, wikis are valuable assets toward achieving these goals in hybrid classrooms.

Fifth, wikis provoke less stress than many assignments, especially those focused on committing material to memory like traditional exams. At my institution, I am entering a role of responsibility for ADA documentation and serving as a liaison between students with documented learning disabilities and faculty. I have already seen how widespread anxiety-related challenges are among students—especially around exams and memorizing material. Collaborative assignments like wikis allow more time for processing, extended reflection, and collegiality with others. For most learners (not just those with documented learning challenges), these factors alleviate stress, diminish isolation, and encourage time management practices that are more realistic and effective, and may even increase self-esteem (Laal and Ghodsi 2012, 487). Given these factors, forms of social cooperation associated with collaborative learning not only yield better learning and results, they may also alleviate unnecessary stress and anxiety in the learning experience.

Wikis: The Shortcomings

Not all of my students would have preferred a collaborative wiki over a more traditional, individual assignment. And there are reasons why.

First, like many group projects, collaborative wikis place less emphasis on individual efforts and accountability. Unfortunately, this sometimes serves to help the less motivated in the class more than the achievers (Yeo and Arazy 2012). This dynamic is not unique to collaborative wikis: it is true for most group projects used as evaluated assignments. And in contexts where individualized performance and evaluation are very important, collaborative wikis may not be an optimal assignment. Individualized tracking of learner contributions—where a wiki platform shows the activity of all individuals—is a constructive step toward rectifying this issue (de Arriba 2017, 364–365). This can also help address a related issue: the potential for plagiarism, which is a concern with online sharing assignments if appropriate safeguards are not in place (Cilliers 2017, 490–492). Logged-in identities for learners, however, helps to track their individual contributions and to monitor (and prevent) any inappropriate forms of information sharing. Even so, multiple layers of editing can make reports of individual work cumbersome to interpret easily (Arazy et al. 2010; Bryant, Forte, and Bruckman 2005; Suh et al. 2008).

Another strategy for addressing this issue is to implement forms of peer evaluation as well as self-evaluation. In view of the different goals of individualized and collaborative learning, Jan van Aalst suggests that peer evaluation and self-evaluation may help gauge individual efforts behind group projects (van Aalst 2013, 289–290). Due to various factors, learner evaluations (peer and self) are somewhat subjective, and in some cases unreliable (if learners are not trustworthy). But many instructors (including myself) find them a helpful, albeit imperfect reflection of the work that has gone on in collaborative groups (Panitz and Panitz 1996). In my experience, where there are major distinctions between the contributions of group participants, they are often happy to clarify those distinctions to an evaluating instructor.

Another way to enhance individual accountability in collaborative wikis is to assign specific tasks to individual members. Doing so places limits around the collaboration, allowing it to be no more than parallel or sequential—not synergistic (discussed above; categories borrowed from Salmons [2019, 12–13]). Still, such boundaries may be necessary, especially in situations where peer-to-peer trust is limited, learner impetus for shared collaboration is low, or the potential for miscommunication is higher than average (Zheng, Nijya, and Warschauer 2015; Cilliers 2017). At the end of the day, wikis are an assignment well-suited to address outcomes oriented around collaborative leadership and creative problem-solving, not necessarily outcomes focused on individualized mastery of material.

Second, group dynamics require deliberate attentiveness and moderating, and sometimes direct intervention. To alleviate group imbalances, it is helpful to establish ground rules or best practices at the outset—or even better, to invite the group to craft their own social covenant to ensure equal voice and participation. For distance learners, another best practice is to budget time, where possible, for a synchronous, web-conferenced gathering for each group at the start, to ensure higher levels of empathy and reciprocity in their ensuing interactions. In environments where learners are unfamiliar with each another and interpersonal trust is low, it is helpful to clarify the goals of constructive critique and strategies for its use on others' work. This can help critical idea-sharing and alleviate hurt feelings. Recent studies suggest that the written (versus oral) form of a collaborative wiki requires a higher level of risk from participants who volunteer their contributions (Arazy et al. 2016). Thus, it is helpful to introduce editing of group members' work as an activity that must be constructive, upbuilding, and for the good of the group. As others who use wikis point out, appropriate instructional support greatly helps successful implementation (Zheng, Nijya, and Warschauer 2015; Cilliers 2017, 491–492).

Third, clarity about the value and goals of collaborative learning are needed, especially in certain learning contexts. Karen Kear et al. describe a classroom experience where a collaborative wiki assignment did not yield collective writing and reciprocal editing to the extent that the instructors had hoped and intended. It was caused by conflicting ideas about the nature of education: "The new kinds of educational activity based on collaboration [i.e., a wiki] . . . were resisted by some students; the activity did not align with their views on what education should involve" (Kear et al 2016, 15). In some learning contexts and for some individual learners, explanation—even persuasion—is necessary for a wiki to yield its full potential as a collaborative exercise. In the context of collaborative learning, greater significance is attributed to the process of group work than in other forms of education, and this needs clarifying.

Conclusions

When student learning outcomes focus on collaborative teamwork and integration of course material, wikis offer valuable learning opportunities for collaboration with others, high levels of integration, and practice with digital literacy tools.

Collaborative wikis require active learning, interpersonal collaboration, and higher levels of integrative thinking (problem-solving, articulating ideas, responding to critique) than assignments that focus primarily on mastery and recall of information. These dynamics tend to encourage more creativity, originality, memory retention, and what many call "deep (versus surface) knowledge." Collaborating with others, moreover, often reduces learners' anxiety, increases self-esteem, and enhances social competence. Finally, collaborative wikis promote digital literacy and work especially well for online and hybrid instructional settings.

Collaborative wikis do, however, present particular challenges. First, discerning each participant's efforts in a group project is not always clear. These challenges may be addressed by individualized tracking of contributions, peer and self-evaluation, and assigning specific roles or tasks to individuals. Second, group dynamics are not always harmonious or constructive, requiring ground rules and moderating from the instructor to ensure healthy dynamics and leadership. Third, as forms of collaborative learning, wikis yield the best results when learners have clarity in understanding the nature, value, and significance of collaborative learning (versus forms of learning more focused on individualized efforts). Finally, since wikis focus a great deal on creative and collaborative construction, they are simply less focused on more individualized student learning outcomes like mastering a set body of traditional information.

I find collaborative wikis to be optimal major assignments at the end of courses that survey wide swaths of literature, especially where other assignments are more individualized. Wikis bring together distance (and residential) students in meaningful and less stressful ways to engage in review and integration of course material, often with more lasting significance. For these reasons, at least for my teaching context and several of my courses, wikis are a more constructive concluding exercise.

Collaborative wikis are not necessarily "better" than traditional, closed-book, individualized final exams—wikis are simply focused on different student learning outcomes that are valuable all their own. For these reasons, wikis may serve various purposes in a course: as a mid-semester assignment, as an activity in preparation for an exam, or simply as a method of class discussion. While serving as lecturer at Vanderbilt University, Chris Paris conducted a semester-long wiki in a class on the Bible in American culture. He asked students to collect pop culture references to the Bible from books, movies, TV shows, music, comic books, and other resources. "The wiki proved to be essential for conducting research and looking for trends to create a thesis for the final paper. The use of the wiki in this course achieved a nice balance between the individual and community aspects" desired by the course outcomes (Paris 2014). Finally, wikis are useful not just for educational settings: they may be used by companies, businesses, religious communities, and civic associations to build collaborative resources and databases that are updated, organic, and readily accessible (Wallace 2007).

One of the benefits of collaborative wikis is the process of collaborative learning. In my experience, wikis tend to yield products of a higher quality, but that is not the main reason I use them. Where I teach, collaborative formation is an institutional value—working constructively and effectively with others is a valued learning goal of my school. While the final product is important, the collaborative process is no less important. And in an educational age where we increasingly value active learning, student initiative, diverse voices, opensource research, open-ended questions, collaborative problem-solving, and working well with others, collaborative wikis have a role to play in making our classrooms more networked, digitally-savvy, and interesting.

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