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Devon Harper

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The Efficacy of Google Slides on Adult Learning Outcomes in a Montessori Teacher Training Center

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in fulfillment of final requirements for the MAED degree

Devon Harper
Saint Catherine University
St. Paul, Minnesota
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Abstract

This action research project investigated how to establish effective instruction and learning tools, specifically, Google Slides within Google Classroom, in an online Montessori Teacher Training Center. Effective instruction includes ways to simulate the positive experiences found in an in-person model, such as community building and collaborative learning. This study investigated training modules, surveys, document collection, and interviews of enrolled adult learners and program instructors. Students and instructors had similar previous experience with Gmail and Google Docs, and less experience with Google Slides. Following the intervention, students reported that Google Slides worked well as an asynchronous learning tool, and the positivity of the impact changed depending on how Google Slides was used. Based on these results, I recommend that instructors incorporate multi-media into Google Slides for both shared and individual use. It is important to consider ways to incorporate group participation in shared Google Slides. Overall, Google Slides is an effective way to engage students in an online setting.

Keywords: Montessori teacher training center, Distance Learning Program (DLP), adult learner, Learning Management System (LMS), Google Classroom, Google Slides
The Montessori approach to education is a growing and expanding field of education. To supply the needed teachers for this growing enterprise, Montessori teacher training institutions exist to provide accredited programs. Montessori teacher training centers that hold a Montessori Accreditation Council for Teacher Education (MACTE) certificate and provide American Montessori Society (AMS) or American Montessori International (AMI) accreditation are highly sought after. To become a certified Montessori guide, an AMS or AMI accredited program must be completed. There is a diversity of options in the structure of the training centers: some are fully in-person programs; some are hybrid models that use online tools and in-person engagement; and others are completed exclusively online. While in-person experiences provide numerous advantages (e.g., flexibility and accessibility, affordability, freedom, and autonomy), there are also many advantages to online models (Allen, 2016).

The onset of COVID-19 required many institutions to switch their curriculum to online models. The Montessori teacher training center that participated in this study (henceforth “training center”) typically holds an in-person summer intensive but were required to move to a Distance Learning Program (DLP) for the summer teacher training intensive. This shift was sudden and required an immediate reevaluation of the methods with which to administer instruction. The training center helps train between 40-100 prospective Montessori teachers each year, and the program has always been executed in an in-person setting. While the shift online produced many challenges to overcome, there were also tremendous benefits and advantages to be acquired.

Educating adults is different than educating children; therefore, the program had the opportunity to look at ways to excite and engage the curiosity and motivation of adult
learners (Knowles, 1995). Not only was it important for the training center to consider adult learners’ needs for learning, the administration and instructors were also required to use and consider digital tools that could enhance a DLP. Around the globe, the demand for DLPs continues to expand (Tainsh, 2016), and research in best practice methods and DLPs is growing with room for further additions and submissions (Allen, 2016).

Using surveys, interviews, document review, and action implementation, this research investigates the research question, “How can Google Slides be used most effectively as an instruction and learning tool to enhance the online experience of students at a MACTE-accredited Montessori training center?” While well versed in Montessori education, instructors were tasked with a quick and necessary turnaround from teaching fully in-person to fully online; therefore, with Google Classroom having been selected by the training center for the summer intensive, instructors had to be trained on how to use Google products.

The study sample included 10 Montessori teachers in training (henceforth “students”) working towards AMS accreditations in Montessori Lower Elementary (ages 6-9) and Montessori Upper Elementary (ages 9-12) at a the same MACTE accredited training center in the summer of 2020. The sample also included five Montessori teacher trainers (henceforth “instructors”) certified in Montessori Elementary I or Elementary I&II that were employed at the training center during the summer of 2020. The study used the Learning Management System (LMS) Google Classroom housed within G Suite for Education. Students and instructors engaged with the LMS from within their chosen environment (e.g. home, office, etc.): students were asked to work away from the training center due to COVID-19 related restrictions, and instructors chose to work on-site at the
training center because the low number of instructors did not conflict with COVID-19 restrictions.

**Theoretical Framework**

I identified the Adult Learning Theory, Andragogy, of Malcolm Knowles as the theoretical framework for my action research. As Knowles states, andragogy describes how adults learn, while pedagogy describes how children learn. Knowles identified that the traditional methods used to educate children are not necessarily effective when educating adults. Certain aspects of andragogy that were considered in this study are Knowles’ Five Assumptions of Adult Learners: self-direction, prior life experience, readiness to learn, an orientation towards learning, and a motivation to learn (Knowles, 1984). Knowles’ Four Principles of Andragogy were also considered and include the following: 1) adults must be involved in planning and instruction; 2) experience, including mistakes, provides the basis for learning; 3) adults learn based on information that is relevant; and 4) adults learn through a problem-centered focus rather than a content-oriented focus (Knowles, 1995).

Andragogy was well suited for this study because it has been frequently used by educators and curriculum specialists when designing programs for adult learners in both in-person and distance learning settings. Few studies have investigated the effectiveness of online programs over time likely because distance learning has been available only for the past 20 years (Allen, 2016). It is also difficult to study online programs because digital technology is constantly evolving (Allen, 2016). Knowles’ understanding and definition of andragogy have been implemented in many distance learning programs and can thus inform adult-education research. Two terms that are
often referenced in relation to distance learning are “synchronous”, which describes interactions that occur in real-time (e.g., a verbal conversation), and “asynchronous”, which describes interactions that occur at different times (e.g., recorded video responses to a question; Kung-Ming & Khoon-Seng, 2005). My research examines whether an online tool – Google Slides – is effective in the application of asynchronous distance learning. Knowles’ definition of the adult learner helped define whether Google Slides might be effective to achieve a given student learning outcome.

Providing a sound basis for my research, andragogy describes how adult learners gain and retain knowledge. My research question was investigated through the lens of andragogy via an exploration of distance learning programs designed for Montessori teachers in training. As the roadmap for distance learning programs is being paved, it is important to look at theoretical frameworks, such as Knowles’ andragogy, as a basis to improve adult learning.

**Review of Literature**

As the needs of students seeking Montessori teaching credentials diversify, professional development methods must evolve. These diversifying needs include but are not limited to flexible scheduling, affordable educational programs, and remote learning. Improved capabilities of modern technology allow for DLPs to thrive. External forces, which currently include those provided by government responses to the COVID-19 pandemic, have significantly increased the need for quality DLPs; therefore, it is essential to evaluate what elements create a meaningful DLP for Montessori teachers in training.

When examining what elements can be effective for educating Montessori teachers in training in a DLP, the abilities of an online tool must be considered.
Technology, which is defined in this review to include all computer-based products, continues to play a central role in American society (Van Volkom, Stapely, & Amaturo, 2014). Therefore, a critical benefit of DLPs is the increased flexibility and accessibility provided through technology. With over 88% of North America’s population (i.e. approximately 320 million people) identified as internet users, DLPs can reach a broad range of students (Tainsh, 2016).

Attrition for students enrolled in DLPs is lower than students in on-site programs (Brindley, 1995). While technology can function as an essential learning tool, it can also provide unwanted distractions (Tainsh, 2016). DLPs may need to compete for student attention against the temptation of opening a web-browser, responding to an email, or sending a text message (Kelly, 2012). Therefore, instructors of DLPs must capture their learners' engagement using methods that are motivating, authentic, and meaningful. Learners can also have a feeling of anonymity when working online, leading to disengagement and apathy (Allen, 2016). Learner ownership and involvement must be addressed with intentionality to maintain student assignation. Research has provided a framework to establish essential elements to consider when designing DLPs and using information and communication technology (ITC).

Malcolm Knowles, "the father of the Adult Learner Theory," established foundational tenants that can be used when considering adult learners (Knowles, 1995). Principles of this adult learning theory indicates that adult learners are self-directed, come with prior life experience, have a readiness to learn, an orientation towards learning, and are motivated to learn (Knowles, 1984). These tenants have been implemented in higher education, religious education, and elementary, secondary, and remedial education.
(Henschke, 2011). Knowles' theory is harmonious with Maria Montessori's understanding and awareness of the needs of learners. Both scientists found that learners are self-directed, identify mistakes as valuable teachers, and have a desire and readiness to learn (Barber, 2020). While Knowles distinguishes pedagogy as the way in which children learn and identified children as dependent on the teacher, Montessori saw children as intrinsically motivated and self-directed learners (Knowles, 1995). Therefore, Knowles' theories are best applied to adult learners through the study of andragogy, which describes how adults learn (Knowles, 1995). While Knowles' work provides the framework for educating adult learners in a DLP, Montessori's methods and understanding can be employed to foster the social and emotional growth of adult learners, particularly in a DLP designed for Montessori teachers in training (Barber, 2020).

When considering educating future Montessori teachers, it is essential to develop devices that stimulate cognitive skills and responsiveness in a DLP. Previous research shows that content must be well organized and coherent to appeal to adult learners (Knowles, 1984). Therefore, the DLP must be easy to understand and intuitive to use to provide adult learners with the autonomy they desire (Allen, 2016). While the LMS must be user-friendly, proper training must also be used. Creating a DLP that supports freedom and independence encourages ownership and investment for adult learners (Barber, 2020). Montessori identified the importance of order and structure to build confidence in students, and adult learners require the same to build confidence (Lillard, 1972). Research has also shown that adult learner engagement increases when presented with relevant information and builds upon prior experience (Tainsh, 2016). Adult learners are
practical and respond to opportunities when applying a skill is meaningful and in response to their immediate needs (Kelly, 2012). Further research showed the importance of using knowledge to solve real-world problems (Allen, 2016). When examining and developing LMS, a variety of student engagement opportunities should be considered.

Creating a learning environment that is welcoming and accessible is valuable to adult learners. Knowles proposed that a positive learning environment must create a climate conducive to learning, including establishing trust between adult members through informality, openness, mutuality, mutual respect, warmth, and caring (Knowles, 1977). Through this process of mutual respect, community building can occur. LMS must be employed to form community and collaboration within the DLP. Intentional opportunities for peer and instructor collaboration through discussion forums and video conferencing allowed learners access to the community group and were shown to increase productivity and engagement (Allen, 2016). Instructors who used community-building tools were required to engage students actively. When left to their own devices, student engagement was lessened (Barber 2020). Community building tools within the DLPs were most successful when instructors used spontaneous praise, humor, and follow-up to student inquiries, indicating interest in their students (Allen, 2016). As Montessori observed in her work with children in the early 1900s, current research on adult learners has shown that adults also responded to a beautiful learning environment (Lillard, 1972). “Incorporating a wide variety of beautiful stimuli (music, poetry, elegant math proof, etc.) can spark interest and imagination” (Barber, 2020, p. 3). Research has thus consistently established the importance of a learning environment that is accessible, welcoming, and beautiful.
There is also a considerable body of research on the importance of student agency in an adult learning program. The act of learning is to construct knowledge; therefore, when educating adult learners, instructors should anticipate that their students have a reserve of prior experience upon which to build new information. When learning is passive, teaching is typically limited; therefore, ownership and involvement must be the focal point of DLP design (Anderson & McCormick, 2005). Studies suggest that a primary way to build freedom and autonomy in a DLP is to initiate choice. Adult learners should have the ability to choose topics of personal interest and have opportunities to apply learning directly to their individual needs, thereby building curiosity and personal agency (Barber, 2020). Research shows that one way to foster student agency is to support students’ feelings of value and validation within the learning environment. Palmer (2017) suggested honoring "little" stories of the individual concerning the "big" stories of the discipline, subject, or practice. The sharing of experiences activates prior knowledge and contributes to a sense of belonging within the learning community.

There are many essential aspects to consider when designing a DLP for adult learners. Cognitive responsiveness, accessible and welcoming learning environments, and student agency must all be achieved to encourage adult learning. While research has provided a basis for the development of many LMS products, like G Suite for Education, which applies Knowles’ andragogy to its design, research continues to modify our understanding of what adult learners need. Thus, investigating adult learners will help improve the design and effectiveness of DLPs.
**GOOGLE SLIDES IN A TEACHER TRAINING CENTER**

**Methods**

This study's primary focus is to understand the impact of Google Slides on curriculum implementation and community building in a DLP. The sampling frame of this study included ten Montessori teachers in training (henceforth “students”) and five experienced Montessori teachers (henceforth “instructors”). The student population consisted entirely of adult learners between the ages of 21 and 50 years old. All student participants were female. The ten students evaluated in this study all had prior teaching experience, some within Montessori schools and others non-Montessori schools: eight had 1-3 years; two had 4+ years. All students were enrolled in the Montessori accredited summer-intensive program of the training center in preparation for seeking Montessori credentials. Each student was also preparing to teach in the fall: some for in-person settings, but all for online settings regardless of whether or not in-person learning was also occurring due to the unpredictability of COVID-19 restrictions. Students planned to use various LMSs in the fall semester: Google Classroom (6), Seesaw (3), and undecided (1). With so many students using Google Classroom in the fall for their own teaching experience, it was beneficial that the LMS used by the training center was also Google Classroom.

The five instructors were all female over 40 years of age, and each had more than 10 years of Montessori teaching experience. While two instructors were teaching their respective courses for the first time at the training center, the other three instructors had taught their courses five or more times. Three of five instructors had administrative and consulting experience as well. Each instructor also had experience teaching at a Montessori teacher training center in the USA prior to the 2020 summer intensive
training. The number of course hours in each course varied: instructor number I taught three courses, and the other instructors taught one each. Course hours are stipulated by MACTE and AMS. Courses were all administered online for the first time in the training center’s history. Both participant groups (i.e. students and instructors) opted into the research and gave written consent to act as participants in this study. While students were chosen at random, instructors were chosen based on the years of experience they each held at the training center, which ranged from new instructors to instructors having over 15 years’ experience.

The training center is located in a city that is sought after for its beauty and location. Thus, this training center is often selected in part because of its location; however, its reputation draws students both locally and country wide. The MACTE certified training center accredits students with an AMS certification in Montessori Infant and Toddler (birth to age three), Montessori Early Childhood (ages three to six), Montessori Lower Elementary (ages six to nine), and Montessori Upper Elementary (ages nine to twelve). Most accreditations are designed to be achieved during a one-year program with a summer intensive and a practicum, the latter of which is completed over the course of one school year with intermittent weekend seminars; the Upper Elementary program is designed to be one week shorter during the summer intensive and does not require a yearlong practicum. This study only investigated students and instructors enrolled in or instructing the Lower and Upper Elementary programs, respectively. Both programs are administered during a full-time schedule (i.e. eight-hour days) over the course of eight and seven weeks, respectively. This program is considered a summer “intensive” because the coursework is condensed and rigorous.
GOOGLE SLIDES IN A TEACHER TRAINING CENTER

The training center traditionally structured the summer intensive program in-person with students meeting daily to receive instruction and training. Evening practice and assignments were then added to complete the robust program. This year, however, due to the COVID-19 pandemic, the training center was obliged to restructure instruction into an online model to allow for safe social distancing requirements. The training center made the decision ahead of state-wide “stay at home” orders, leaving the training center less than six weeks to prepare the program, instructors, and students for online instruction.

During this time, I reached out to the training center in an effort to offer my support and any possible guidance. I am a Montessori educator with MACTE-certified AMS accreditations in Montessori Early Childhood, Montessori Lower Elementary, and Montessori Upper Elementary, and recently received an overview certification in Montessori Infant and Toddler. Having 12 years of teaching experience in Montessori, both within in the US and abroad in Chile, Nepal, and Switzerland, I felt my experience as an educator could help guide the training center’s transition to online learning. More importantly, I was also experiencing what it felt like to be enrolled in a DLP in my work towards a M.Ed. from St. Catherine’s University. Interested in LMSs, I sought to educate myself through self-guided research and discovered that Google Classroom, which is housed within G Suite for Education, provides an excellent LMS that could be applied at the training center. I then completed an online training program through the “Teacher Center” in Google for Education, a free service that offers training in Google tools for new and advanced learners. This training helped me prepare for my action research and
better informed the use of Google tools, specifically, Google Slides investigated in this study.

The procedures used in this study are outlined in Table 1: Timeline of Methods. The study began with a Pre-course Survey given to the five instructors (see Appendix A) and the 10 students (see Appendix B) who participated in this study. This survey was designed to assess the readiness of both parties with regard to using online tools for the coming summer. Google Classroom was the chosen LMS; therefore, questions about participants experience with tools used within the training center’s program were presented on a Likert Scale from “no experience” to “expert”. These tools include Google Classroom itself, Gmail, Google Slides, Google Drive and more. Many of these systems work together and can be used in tandem with one another; therefore, while Google Slides was the focus of this study, the importance of understanding other Google products was also important for implementing Google Slides.

The Pre-course Survey also included five social and emotional readiness for entering a fully online program and included questions like, “Overall, how are you feeling going into the summer program online?” and “How are you feeling about the potential screen time?” With possible responses presented on a Likert Scale, these five emotive questions assessed comfortability on a scale from “apprehensive” to “confident”. Students were also asked which LMS, if any, they would be using in the coming school year in their own classrooms. Upon reviewing and comparing the responses of both instructors and students, an experimental design was developed to address both groups’ concerns.
The intervention portion of this study consisted of three parts. First, I designed an online training seminar for instructors to address their concerns and help prepare them for potential concerns and needs of their students. The training seminar was delivered synchronously via the video conferencing software, ZOOM. This training seminar provided instructors with opportunities to try tools within Google Classroom, sharing successes and learning additional capabilities, while also enhancing comfort with the LMS. Next, I created a Google Classroom Tools How-to document that allowed instructors access to a "How To" page that guided them through creating assignments within Google Classroom. This document enabled instructors to share and assign Google Slides to students (see Appendix C). Last, I created example Google Slides to highlight
GOOGLE SLIDES IN A TEACHER TRAINING CENTER

how Google Slides can be used, providing instructors relevant models to develop their own slides. These examples included:

1. A Google Slides Presentation on *Digital Grace and Courtesy in a Shared Community* (see Appendix D), which highlights positive boundaries and expectations for instructors and students within an online community. This document was made accessible to all members of the study and the training center.

2. Google Slides Presentations for instructor and student introductions, which was used with all members of the training center to build an initial sense of community within the summer cohort (see Appendix E).

3. Google Slide Presentations for *Introduction to Montessori Practical Life: Early Childhood* (see Appendix D) and *Introduction to Cultural: Early Childhood* (see Appendix D). These presentations were created and used with students prior to the official start date of the Lower and Upper Elementary Training Course Components and, therefore, were available for instructors to use as a reference point when needed because they had already been used in a different aspect of the program.

Instructors and students were asked to engage with Google Slides for the first time before the summer intensive began. Instructors were asked to create a single slide that introduced themselves to the cohort, and each of these slides was added to a collaborative slide presentation; students were also asked to create the same. This method allowed both participant groups to engage with Google Slides as an introduction. Prior to the summer intensive, students were also asked to participate in the “Digital
Grace and Courtesy in a Shared Community” training that was created in Google Slides. Both of these experiences provided practice and another way to engage with Google Slides, and also provided a model for instructors of what a completed slide deck could look like. Through an online training module and examples, both of which I created specifically for this training center, instructors were able to see how Google Slides could be used as a collaborative tool.

Following the experimental design at the end of the program, I reviewed Lesson Plans and Google Slide Assignments from instructors to ascertain how instructors had used Google Slides during the program. Instructors provided Lesson Plans and Applied Lessons, which included the use of Google Slides, allowing for document review and analysis of the capacity in which instructors used Google Slides. Lesson Plans were used for observation only and pertained to Google Slides; lessons designed towards other aspects of the LMS were not considered in this study. After I initiated the training module and provide Google Slide resources, instructors were able to create and upload Google Slide assignments within Google Classroom. These assignments were compared to the number of course hours each instructor taught at the training center to ascertain how often Google Slides were used in each course.

It was also important to review the documents for how Google Slides were used. One-on-one interviews with each instructor allowed the instructors to present feedback in a more casual setting. Instructors were asked various questions about their experience with Google Slides during the program, including “How did Google Slides help you assess the engagement of your students?”, “What do you feel went well using Google Slides?”, and “Would you use Google Slides again in the future if needed? If so, how?”
These interviews were then inductively coded based on common responses. I read written transcripts created from personal notes multiple times to identify common themes and used these themes to create a coding system. Overall, the document review for instructors and the instructor interviews provided the feedback needed to describe how Google Slides and associated strategies had been implemented. This feedback also provided further information on Google Slide uses and successes from the instructor perspective.

To include the student perspective in the document review, I also examined the scores that each student received for the Google-Slides-based assignments posted by the instructors. Students were given a pass or fail for each assignment; however, all students completed all assignments assigned throughout the program. This result shows that all students engaged with Google Slides multiple times throughout the summer and are therefore able to reflect and respond to questions about their experience with Google Slides.

Following the course, students were given Post Course Surveys (see Appendix F) to describe their experiences about each course and a Post Program Survey (see Appendix G) to describe their experiences with the program as a whole. Within the Post Course Surveys, students were asked to respond to what tool(s) used in the program was/were most valuable (e.g., pre-recorded videos, group projects, readings) and how they felt Google Slides contributed to their success in the program. The Post Program Survey gave students the further opportunity to respond to the overall program using open-ended questions targeted towards the asynchronous tools utilized. This survey was
designed to better support the training center in its entirety and only answers that pertained to Google Slides were investigated in this study.

Instructors also participated in a Post Lesson Interview to share and reflect on the use and efficacy of Google Slides (see Appendix H). Post Lesson Interviews offered instructors an opportunity to reflect on personal experiences using Google Slides and consisted of five questions that were kept consistent and open-ended. These interviews took an average of ten minutes.

Instructors and students also answered a Post Course Evaluation to provide comments on asynchronous and synchronous assignments that directly related to the course of each instructor. Questions in the survey included “Which types of assignments were engaging and educational?” and “What would have improved the synchronous time?” These reflective questions allowed both instructors and students the chance to express feedback, criticism, and commentary about Google Classroom as an LMS. A Post Program Survey was also given to both students (see Appendix G) and instructors (see Appendix I). Both surveys utilized the same questions; however, the Post Program Evaluation asked respondents to reflect on the overall program rather than individual instructors or courses. Google Slide examples were then given further study and examination in the results and conclusions process.

Results

The Pre-course Surveys for instructors (see Appendix A) and students (see Appendix B) provided valuable information about the experience each group had with Google tools. When asked about their experience with Google tools, all students felt comfortable using Gmail and Google Drive, while comfort with Google Slides and
Google Classroom varied (Figure 1). These variations revealed that students either had exposure to Google Classroom or Google Drive, or had no experience with these tools. In total, 25-38% students had no experience with Google Slides or Google Classroom, while the majority (64-75%) felt at least proficient.

![Bar chart showing student and instructor perceived comfort of Google tools prior to intervention](image)

**Figure 1.** Student and instructor perceived comfort of Google tools prior to intervention ($n_{students} = 8$, $n_{instructors} = 5$).

The experience level of instructors with Google Slides and Google Classroom varied as well, with 40% having no experience with Google Classroom and 60% having no experience with Google Slides (Figure 1). Gmail and Google Drive remained the more familiar tool for instructors, and all reported feeling proficient or expert with these tools.
GOOGLE SLIDES IN A TEACHER TRAINING CENTER

Comparing student and instructor comfort with Google tools indicated that students generally had more experience with Google tools than instructors. Both groups were most comfortable with Gmail (100% proficient or expert) and Google Drive (100% proficient or expert; Figure 1). The largest disparity in experience between instructors and students was found in Google Slides, with 60% of instructors having no experience compared to 75% of students feeling at least proficient.

Document Review

Clear trends emerged in how instructors used Google Slides to teach their courses (Table 2). The type of slides that instructors created and assigned fell into four distinct categories: group sharing, group collaborative, resource, and individual (see Appendix J1-4). Instructors had a choice of which type of slide they would like to use in their course(s). Group sharing slides are defined as any Google Slide deck that allowed students to contribute to the slide deck and see the work of others with all students having the same assignment. For example, students might be invited to engage with a material, photograph the outcome, and add a slide that they created about their experience to a Google Slide deck that is seen and shared by all in the course. The assignment in this example is the same for each student, and each student’s result should generally describe the same outcome. This type of assignment differs from a group collaborative Google Slide deck, where all students are given an assignment with a similar theme, such as researching a chosen topic that falls under one umbrella topic (e.g., challenges in education), where the slide created by each student will generally not describe the same outcome.
Table 2

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Course Hours</th>
<th>Slide Type Used</th>
<th>Frequency Used</th>
<th>Slide Complexitya</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>87.5</td>
<td>Group sharing</td>
<td>6</td>
<td>low</td>
</tr>
<tr>
<td>2</td>
<td>45.5</td>
<td>Group sharing</td>
<td>9</td>
<td>low</td>
</tr>
<tr>
<td>3</td>
<td>37.5</td>
<td>Group collaborative</td>
<td>1</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resource</td>
<td>1</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual</td>
<td>2</td>
<td>high</td>
</tr>
<tr>
<td>4</td>
<td>44.5</td>
<td>Group collaborative</td>
<td>4</td>
<td>medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Resource</td>
<td>2</td>
<td>medium</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>Group collaborative</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Note. Complexity was evaluated qualitatively based on number of slides created by the instructor within the slide deck.

In a group collaborative assignment, students could share what they learned and see what other students had created, thereby creating a resource that everyone could use. The commonality between group sharing and group collaborative assignments is that they both require student engagement and creation. In these models, the instructor creates the assignment and one or two slides that describe the task, and students are then responsible for building the slide deck to create the resource for the course. The onus, therefore, in both group sharing and group collaborative assignments is on the students.

The following two categories, resource and individual, place the onus of slide creation on the instructor and engagement on the students. A resource Google Slide deck is one that is created by the instructor and then uploaded for students to access. Only the instructor can then manipulate the deck; students can review it but cannot manipulate it. Resources can include slides from a previous in-person presentation or examples of a work or material that the students should review.
The final type of slide deck is *individual* Google Slides. This assignment requires the instructor to create a slide deck that is then assigned to each student individually. Then, only one student and the instructor can engage with the slide deck. The primary use of this type of slide deck is to engage students in an asynchronous exercise that guides students through a full three hours of course work. An *individual* slide deck may include website links, video examples, reading assignments, and small activities to test the comprehension of and provide accountability for students. This type of slide deck is more involved and detailed than the other types of slide decks. It is possible to create a Google Slide deck that is both *individual* and student-created; however, no instructor used this model. Not all instructors used all types of Google Slides; thus, not all instructors had a chance to try each type. However, all students were exposed to all slide deck types.

**Perceptions of Preparedness**

Post Course Surveys and Post Program Surveys provided data on the perceived attitudes and outcomes of Google Slide use. When comparing student outcomes to the type of slide the student engaged with, students felt that a course assignment with mostly *group collaborative* slides with some *resources* yielded the best learning (Figure 2). For example, one student responded, “I love working on shared slides and getting to see what my classmates did (observation record, July 30, 2020).”
Figure 2. Student perceived learning effectiveness of success compared to Google Slide type.

A total of 40% of students reported learning success with group sharing and group collaborative Google Slide decks, indicating that the learning outcomes from these two slide types were mixed: some respondents felt that these slide decks prepared them for success, while others did not. Of the five respondents reviewed for mostly individual slides, over half (60%) felt that this slide type prepared them for success. For example, one student stated, “It was helpful to have the Google Slides presentations to guide our exploration each day. The combination of videos and additional website resources were useful for learning during the course and to keep for the future (observation record, July
29, 2020).” Another student wrote, “I enjoyed the Google Slides walking us through the assignments and the time to complete the work (observation record, July 27, 2020).”

Overall, these results show that all slide types provided students with feelings of success; however, some yielded more positive learning experiences than others. The number of students indicating success with group sharing slides was the highest; this result may be explained by the fact that group sharing slides were the most commonly used slide type, and most students were exposed to this slide type, which provides confidence to the accuracy of these results. The low sample sizes with group collaborative, mostly group collaborative, and mostly individual slide types are an inherent limitation of the study design.

Each slide type provided instructors with different ways to assess student engagement. When instructors were asked to reflect on how the slide type they chose impacted student learning outcomes, the group sharing slide type yielded varied responses: excellent (1), good (1), and unsure (1; Table 3). One instructor that used group sharing slides exclusively reported, “Slides were particularly useful for proof of ‘control of error’ on assignments (interview, October 8, 2020).” Another that exclusively used group sharing slides stated, “Assignments where students were able to post a picture were very helpful for assessing student learning (interview, October 7, 2020).”
Table 3

<table>
<thead>
<tr>
<th>Slide Type</th>
<th>Instructor Perception of Student Learning</th>
<th>Number of classes</th>
<th>Number of Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Sharing</td>
<td>Excellent (3), Good (1), Unsure (1)</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Group Collaborative</td>
<td>Excellent</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mostly Group Collaborative with some resources</td>
<td>Unsure</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mostly Individual with some mixed</td>
<td>Good</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Five instructors reviewed these slide types. Instructor 1 taught three courses; therefore, their review is represented three times for each course.

*Group collaborative* slides were considered an excellent assessment of student learning and engagement by the instructor who assigned this slide type. While many instructors used *group sharing* slides, other slide types were only used by one instructor. For example, *group collaborative, mostly group collaborative with some resources, and mostly individual with some mixed* slides were all used by only one instructor; this is an inherent limitation of the study design.

**Student Experience with Online Tools**

Student experiences with different asynchronous assignment types were investigated and disaggregated by slide type to describe what students found to be effective learning tools (Figure 6). Pre-recorded videos generally yielded the best student learning experience (80% of students) when slides were used for either *mostly individual* or *mostly group collaborative work with some resources*, and with *group sharing* slides but to a much lesser extent (40%; Figure 6). Group and independent slide projects yielded the next best student learning experience (60% of students) when using *group*
collaborative or mostly individual slides. Group projects also yielded effective student learning when used with group sharing slides but not with group collaborative slides with resources. Generally, readings and resources were not viewed as effective learning tools by most students (14-20%) for all slide types.

![Bar chart showing percentage of students who valued asynchronous assignment types based on Google Slide type.](image)

**Figure 6.** Percentage of students who valued asynchronous assignment types based on Google Slide type. Sample sizes are shown at the top of each bar.

Overall, the greatest area of disparity existed between instructor experience with Google Slides compared to that of the students. Following the intervention, the instructors were able to gain skills in how to utilize Google Slides. From this, the document review revealed four distinct ways that the instructors utilized Google Slides. Overall, these results show that all slide types provided students with feelings of success; however, some yielded more positive learning experiences than others.
Action Plan

The purpose of this study was to evaluate how Google Slides can be used to help train Montessori teachers in training in a MACTE-accredited training center. This study was timely due to the fact that the training center needed to transition from in-person instruction, where students only needed a computer to write a paper, to an online platform, where computers were used for all aspects of instruction and assignments. The instructors that participated in the study all had prior experience instructing courses in-person and were therefore experts in their subject and this form of instruction. The training center was also setup for in-person instruction with well-stocked classrooms, established protocols for in-person learning, and student success strategies within an existing building. Moving everything online required all of these facets of instruction and learning to be reevaluated.

Moving instruction online first demanded the need for an LMS. Google Classroom was chosen to be investigated in this study due to its cost-effectiveness and user-friendliness for both child and adult learners. Choosing to use Google Classroom at the training center proved to be a practical choice because many students who attended the training center were preparing to use Google Classroom in the Fall in their own classroom environments online or in a hybrid model.

Given this research context, this study investigated how to establish effective instruction and learning tools using Google Classroom to simulate the positive experiences found in the in-person model (e.g., community building, collaborative learning, hands-on experiences) in an online model. Schools can opt to have G Suite for
GOOGLE SLIDES IN A TEACHER TRAINING CENTER

Education, which is a suite of tools that includes Google Classroom, Chat, Sheets, Forms, Gmail, Calendar, Hangouts, Docs, and Slides. While some of these products are available outside of G Suite for Education, having the licenses to use the full suite of tools commercially allows the tools to be used together in one location. While many of these tools provide diverse opportunities for use, Google Slides presented the most options for versatility, creativity, and collaboration in both instruction and learning. Thus, this study investigates the question “How can Google Slides be used most effectively as an instruction and learning tool to enhance the online experience of students at a MACTE-accredited Montessori training center?”.

At the beginning of the study, data showed that both students and instructors had experience with some form of Google tool, with Gmail being the most common and comfortable for all users (Figures 1 and 2). Google Docs was another tool that instructors and students both felt comfortable using. This experience among both groups was advantageous because it provided a starting point when designing a training module to help instructors prepare for online instruction. However, many instructors and students were not comfortable using Google Slides; therefore, having ways to practice and review slide options was essential. Opportunities for practice and slide review were incorporated into the training module as well as example and practice slides. Giving instructors opportunities to practice with Google Slides in a manageable way was useful; thus, any training involving new online tools should include some form of practice alongside a presentation or resource that describes various ways to use an online tool. Although adult learners are being taught at training centers, teaching protocols should focus on providing students with experience-based instruction rather than focusing on lecture-based
instruction. Knowles (1984) identified that adult learners learn by engaging directly in the activity, allowing opportunities for mistakes. Adult learners learn by doing; therefore, this must be incorporated into training protocols.

Following training, documents created by instructors showed how Google Slides had been used in the courses they taught. Of the four types of Google Slides used (i.e. group sharing, group collaborative, resource, and individual), group sharing slides were the most common and the slide type that instructors felt gave the most accurate evaluation of student learning. Although students found some benefit to their learning with this slide type, they generally preferred group collaborative slides. There are distinct differences that set these two styles apart. While both types allow the entire group to share in the learning process, group sharing slides remove student creativity from the assignment by proscribing a problem and defining what its solutions should look like. With this slide type, all outcomes are similar. Conversely, group collaborative slides allow students creative liberty and personal ownership of their work. Group collaborative slides also allow students to learn new information from their peers. Community building and positive peer engagement are considered a necessary aspect of adult learning programs (Allen 2016; Knowles, 1977). Based on these results, group collaborative slides should be used for asynchronous instruction at Montessori training centers to fulfil students’ desires to be creative, autonomous, and share in the learning.

Resources provided as Google Slides were also beneficial. Students perceived resources as similar to reading assignments, book passages, or other static documents that provided opportunities to review and reflect on information. This passive use of Google Slides contrasts to the more active use of the other three slide types but still provides
valuable learning that stimulates adult learner's cognitive skills and provides opportunities for autonomy (Allen, 2016). Because the resource slide type is used frequently in synchronous discussions, it continues to prove valuable as a consistent learning tool in the most traditional use of leading a presentation through a series of slides. However, instructors that used resources provided as Google Slides did not use them as a synchronous presentation tool but rather as examples and writings for students to review asynchronously.

One instructor created assignments that used individual slides twice, which required the most instructor creativity and a high level of engagement from students. Generally, instructors believed that individual slides provide a fair assessment of student learning, and students agreed that they were an effective teaching tool. The learning style engaged by individual slides follows many tenants of Knowles (1984, 1995), including allowing adult learners to self-pace their instruction, learn relevant information, be self-directed, allow for mistakes, and focus on intrinsic motivation. Based on these results, instructors should consider using individual slides when engaging students asynchronously. For example, many students felt that YouTube videos were beneficial to their learning, and that having resources helped enhance their knowledge base; individual slides were able to combine both of these tools in one location.

Looking beyond Google Slides, the results of this study show that students found pre-recorded YouTube videos to be the most effective learning tool. Because G Suite for Education and YouTube are both Google products, sharing YouTube videos within Google Classroom is easy; for example, a Gmail account is used to access YouTube and also allows access to multiple collaborators on a single YouTube channel if a G Suite
GOOGLE SLIDES IN A TEACHER TRAINING CENTER

product is used. There is also a built-in method to add a YouTube link to Google Slides, enhancing the learning tool by maximizing access to relevant YouTube videos. This ability also allows for the creation of sequential instruction in Google Slides; group projects were also perceived to be valuable asynchronous learning opportunities.

Google Slides is thus a positive way to create group projects that can be shared and worked on together in productive and meaningful ways. Group projects can also be completed using Google Docs and Chat; however, Slides offer more diverse forms of sharing information, such as incorporating pictures, videos, and other media.

Based on these results, researchers should investigate ways to incorporate multi-media into group collaborative slides. Because students primarily found YouTube videos useful but also felt that group collaborative projects were the most beneficial to their learning, finding ways to use mixed media in Google Slides should yield the best student learning outcomes. For example, students could be given an assignment, such as "Discuss a challenge facing young learners today. Dedicate one slide to a video representation, one slide to listing resources with one-sentence summaries that describe this challenge, and one slide to discuss your findings." Incorporating mixed media in this type of assignment will allow each student to research one topic of their choosing and also benefit from the collective knowledge base and work of other students. This assignment would encompass three of Knowles' Four Principles for Andragogy: involving adults in planning, learning based on relevant information, and learning through a problem-centered focus rather than a content-oriented focus (Knowles, 1995).

Overall, Google Slides proved to be an effective way to engage students in an online setting. When considering Google Classroom as an LMS, this tool enhanced
instructors' work and students’ learning. Google Slides also proved versatile in its ability to engage adult learners in the theoretical precepts of both Knowles' Five Assumptions of Adult Learners and Knowle's Principles of Andragogy (Knowles 1984, 1995), showing that Google Slides can help to self-motivate students, activate their readiness to learn, and engage them in problem-centered activities.

One of the most valuable takeaways of this study is how all participants, both students engaging in Montessori training and seasoned instructors, learned a new skill by using an LMS in a DLP, which required adaptability and self-reflection. One of the primary Montessori tenants is the ability to create and honor life-long learners. This study revealed that all participants were willing to learn and try something new, and the value in the willingness of instructors to try new things cannot be understated. While instructors and students varied on which style of Google Slides was the most effective, all agreed that some form of Google Slide was a useful learning tool. Overall, all participants showed that even with little experience with an online tool like Google Slides, practice, training and implementation with Google Slides was successful. Distance learning in a Montessori teacher training center can thus be effective when digital tools like Google Slides are used to foster student learning.
References


Kelly, Nate. (2012). The information battlefield: Trainers who combine technology with application of Malcolm Knowles' adult-learning characteristics have a strategic


Appendix A

Pre-course Survey Questions – Instructors

This survey was given to all instructors via Google Forms to assess their experience and comfort with some Google tools prior to intervention.

Name (fill in the blank):
Courses Taught (fill in the blank):

<table>
<thead>
<tr>
<th>Please rate your comfort level with Gmail</th>
<th>Please rate your comfort level with Google Drive</th>
<th>Please rate your comfort level with Google Classroom</th>
<th>Please rate your comfort level with Google Slides</th>
</tr>
</thead>
</table>

Note: Answers were on a Likert Scale with the following response options: no experience, some experience, proficient, expert
Appendix B

Pre-course Survey Questions - Students

This survey was given to all students via Google Forms to assess their experience and comfort with some Google tools prior to intervention.

Name (fill in the blank):
Level (fill in the blank):

<table>
<thead>
<tr>
<th>Please rate your comfort level with Gmail</th>
<th>Please rate your comfort level with Google Drive</th>
<th>Please rate your comfort level with Google Classroom</th>
<th>Please rate your comfort level with Google Slides</th>
</tr>
</thead>
</table>

Note: Answers were on a Likert Scale with the following response options: no experience, some experience, proficient, expert
Appendix C

Google Classroom Tools How-to

This resource was given to instructors to describe how to create assignments, including Google Slides, within Google Classroom.

To access this file please visit: https://docs.google.com/document/d/e/2PACX-1vRFcELQyuwFIU3Fi_ATo8HxE08JNd8FeV51kc4Kq19cz3kF3ZrE_maUNA2A863fU2cg2zOFKby-4/pub
Appendix D

Google Slide Examples

Google Slides were created for instructors and students to use as examples as they developed teaching materials and assignments. These examples were provided as resources that could be examined and reviewed at any time. Instructors had access to all example slide decks, while students only had access to “Digital Grace and Courtesy in a Shared Community.”

Digital Grace and Courtesy in a Shared Community

To visit these example slides, please go to:
https://docs.google.com/presentation/d/e/2PACX-1vSwW5r53XuNaoU7ONhwyCcN_fc5qifaZY1Bdsj34TuIWdPUcLG5zFcNYmO-g2tUu_B5p7teicob52s/pub?start=true&loop=true&delayms=60000

Introduction to Montessori Practical Life

To visit these example slides, please go to:
https://docs.google.com/presentation/d/e/2PACX-1vSc1HN_aqiO5kcLtHCCo7f7hFRMCBaFQHSO6mUW2_t_snpYueqjWPXZKN7GRk_2YeeP9qbbJaO0TDVmo/pub?start=true&loop=true&delayms=60000

Introduction to Early Childhood Cultural

To visit these example slides, please go to:
https://docs.google.com/presentation/d/e/2PACX-1vRk1GKoqkFY2szlYRFbFB9Nz8PkJ2prYSQ4TSI1TrinO3D_EX2QeSiMWjjZzqfE-X0mt2vuAadDsEQ/pub?start=true&loop=true&delayms=60000
Appendix E

Instructor and student “Getting to Know You” Slides Instructions

This slide deck was created as an example Google Slide file where instructors and students were able to manipulate the slide deck. This allowed instructors and students to practice how to use Google Slides.

Instructions

- Click the arrow next to the plus sign to choose a slide format.
- On your slide please be sure to:
  - Include your name (as you would like your peers and instructors to call you)
  - Add a photo of yourself (though we can’t be in person, we would still like to learn the names of the smiling faces in Zoom)
  - Write about one new skill you have recently learned
- Then you are done!
- As this is a working document, be sure to add to your own slide then learn about your peers by flipping through the slidedeck.
Appendix F

Post Course Survey Questions – Students

This survey was given to all students via Google Forms following the intervention. Questions referenced the specific courses taught by each instructor reviewed for this study.

1. Please enter your full name

2. Name of Course Component

3. In terms of both content and delivery, what aspects of this course component were the most valuable and enlightening?

4. Please comment on the types of asynchronous assignments that you completed during this component. Which types were engaging and educational? Which types of assignments were less beneficial?

5. For the synchronous portions of the course, what type of instruction did you benefit from? (Examples: lecture, pre-recorded videos, polls such as Mentimeter, breakout rooms, comments in the chat.). What would have improved the synchronous time?

6. Additional Comments and Feedback

*Responses were short answer.
Appendix G

Post Program Survey Questions – Students

This survey was given to all students via Google Forms following the intervention. Questions referenced the overall summer intensive.

1. Name

2. Course Level

3. What aspects of the summer course have had the greatest impact on you?

4. What part of the summer program did you enjoy most?

5. Do you feel prepared to begin using materials to deliver lessons and working with children using the Montessori approach?

6. Comments about being prepared for practicum in the previous question (optional):

7. What are some areas for course improvement?

8. Additional comments:

*Responses were short answer
Appendix H

Instructor Post Lesson Interview Questions

These questions were administered to each instructor during a 15-minute phone call. Instructor responses were reviewed and analyzed to assess instructor perceptions of Google Slides.

1. What was the primary digital tool used throughout the summer? Was this tool used synchronously or asynchronously?
2. How often did you use Google Slides?
3. How did Google Slides help you assess the engagement of the students?
4. What do you feel went well using Google Slides?
5. Would you use Google Slides again in the future if needed? If so, how?
Appendix I

Post Program Survey Questions – Instructors

This survey was given to all instructors via Google Forms following the intervention. Questions referenced the overall summer intensive.

1. Name
2. Course Component
3. Course Level

Please comment on the following:

4. Student readiness to enter the course
5. Student workload
6. Online classroom environment
7. Assessment of student progress and performance
8. What did you do that improved your course this session? Please consider digital tools you were able to utilize.
9. Overall, what would you like to improve in the future?

*Responses were “short answer”
Appendix J

Document Review Examples

The examples shown in Figure J1 show the different types of Google Slides that were created by instructors.

**Figure J1. Examples of group sharing slides**

**Figure J2. Examples of group collaborative slides**

**Figure J3. Examples of resource slides**
Figure J4. Examples of individual slides