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Expanding Learning Opportunities in Kinesiology Through the Use of Flipped Instruction

Chad M. Killian and Amelia Mays Woods

Millennial college students are typically digital natives who prefer experiential and active learning. This preference is in contrast to the traditional lecture method of teaching in higher education. Flipped instruction provides instructors with a means to integrate technology into their courses and expand active-learning opportunities. In flipped courses, students engage with technology-assisted learning opportunities outside the classroom. Corresponding in-class active-learning opportunities encourage students to apply foundational knowledge. This article summarizes research and provides an authentic case example to illustrate the way in which flipped instruction was applied in a physical education teacher education course to expand learning opportunities in the field.

Keywords: blended learning, e-learning, higher education, hybrid, inverted learning

Most students currently attending colleges and universities are part of the millennial generation. They are considered digital natives, having grown up in a world where computers and the Internet are integrated into daily living (Merritt & Neville, 2002). Millennials are continuously connected to information and tend to appreciate group and social learning (McMahon & Pospisil, 2005). Their learning preferences are unique compared with students from other generations, as they have a clear desire for more active, experiential learning opportunities, which challenges the traditional lecture as the primary method of disseminating knowledge in higher education (Phillips & Trainor, 2014; Skiba & Barton, 2006).

Flipped instruction is emerging as a means for college and university instructors and faculty to modify their teaching methods to increase active learning. Use of online technology to disseminate instruction, combined with an increase in active in-class learning opportunities, makes flipped instruction a practical teaching method for faculty seeking to align their pedagogy with the general learning preferences of millennial students. In addition, flipped instruction has broad applications across disciplines (Roehl, Reddy, & Shannon, 2013) and can be adopted into any lecture-based or applied course in which active learning and skill development are foundational components. The potential of flipped instruction to provide space for active-learning opportunities may be particularly beneficial to the field of kinesiology, where many courses focus on applied, procedural knowledge (i.e., exercise physiology labs, physical education teacher education early field experiences, and instructional physical activity courses).

Research on Flipped Instruction in Higher Education

Flipped instruction is an asynchronous method of teaching defined by the combination of instructional technology to prepare students for classes and scheduled face-to-face meetings between the teacher and students (Lo & Hew, 2017). More specifically, instructors and faculty applying flipped instruction should include intentional, technology-assisted, student-guided learning opportunities outside the classroom that focus on foundational knowledge acquisition paired with teacher-assisted, student-centered, active-learning opportunities in the classroom focused on critical knowledge and skill application (Yarbro, Arfstrom, McKnight, & McKnight, 2014). The combination of asynchronous instructional technology and corresponding in-class, applied learning is what defines flipped instruction. Inherent characteristics of flipped instruction therefore include (a) the capacity for students to navigate content at their own pace, (b) continuous availability of online content for students to review, and (c) more effective use of class time for applied learning opportunities (Fulton, 2012).

Faculty members and instructors who implement flipped instruction with fidelity become facilitators rather than disseminators of knowledge, a shift from the traditional conceptualization of teaching in higher education. Flipped instruction should promote students' preparation for class, because through this approach they learn key concepts in advance through online videos or presentations. In-class time then becomes available for guided practice opportunities, whereby students engage in a variety of active-learning experiences that encourage the application of key concepts they previously learned through the online instruction (Hawks, 2014). This increase in active-learning opportunities represents a key benefit of flipped instruction, particularly in courses focused on procedural knowledge or skill development.

Flipped Instruction and Active Learning

Properly implemented flipped instruction results in a number of positive outcomes. One primary advantage is an increase in active in-class learning (Milman, 2012). Class time can be used more effectively to engage students in course content, given that teachers focus on facilitating active-learning tasks instead of focusing on passive delivery of content (Fulton, 2012). Indeed, several researchers indicated that their rationale for implementing flipped instruction was rooted in its potential to increase active-learning opportunities and promote a more efficient use of class time (Rivera, 2015; Schilling, 2014).

Based on the inherent limitations of an exercise physiology laboratory, Elmer, Carter, Armga, and Carter (2016) were motivated to examine the use of blended (flipped) instruction to

The authors are with the Dept. of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Urbana, IL. Woods (amywoods@illinois.edu) is corresponding author.

overcome barriers and maximize effective learning experience. They noted that the structure of these labs often includes prelab readings, an in-lab demonstration using direct instruction, and a culminating applied experiment. In addition, time limitations tended to not allow for all students to have opportunities to participate in the lab experiments. Outcomes of that study included positive student perceptions of the flipped method and the overall lab experience due to students' sense that they were more prepared for lab activities and that lab time was used more effectively. The students also generally agreed that preclass videos rather than readings enhanced their learning, although differences in achievement were not significant between flipped instruction and traditional lab groups.

Another study (Mason, Shuman, & Cook, 2013) provided more specific evidence related to the association between the use of flipped instruction and the shift toward in-class active learning, on one hand, and student achievement. Students enrolled in flipped sections of an upper-level college engineering course scored as well or better on all quiz and exam problem types than their counterparts experiencing traditional lecture methods. These undergraduates demonstrated patterns of significantly higher achievement on design-based and open-loop problem types. Researchers speculated that the online content used with the flipped sections allowed for increased focus on the design process during subsequent in-class, active-learning activities. The added in-class opportunities to apply knowledge with instructor feedback was noted as a key contributor in helping students develop a deeper understanding of course content, which thereby led to improved performance (Mason et al., 2013).

Similar results illustrating the association between in-class application of online content and student achievement were reported in a study of university pharmacy students (Munson & Pierce, 2015). Students in a flipped pharmacogenomics course performed significantly better on test items directly linked to in-class active-earning opportunities than did students receiving traditional instruction. Implicit in these results was the relationship between in-class practice and student performance. The in-class portion of a flipped class tended to promote students' application of foundational knowledge with instructor support, unlike traditional instruction, whereby students learn content during class and apply knowledge through homework and other out-of-school assignments, mostly independent of instructor support. These studies point to the potential association between increases in active learning embedded in the flipped instructional approach and student performance.

The flipped instructional approach has also been studied in a university bowling course, in which students were required to engage with online instructional videos prior to arriving in class (Killian, Trendowski, & Woods, 2016). Students in that study noted that their primary preference for flipped learning in the course was related to added bowling during class time. Absence of initial in-class skill demonstrations and content delivery through large-group instruction allowed students to begin bowling on arrival at the bowling alley. These results provide preliminary evidence that flipped instruction could be a teaching method for physical activity instructors seeking to integrate added moderate to vigorous physical activity opportunities for students.

Quantity of Content and Efficiency of Delivery

Evidence indicates that flipped instruction can enable teachers to increase the quantity and efficiency of content delivery without extending class time. Students enrolled in a flipped learning course engaged in an additional week of content when compared with students in the same course using traditional methods of instruction (Mason et al., 2013). Similarly, despite a 40% reduction in class time due to departmental curricular changes, Schilling (2014) reported that using flipped instruction resulted in increased efficiency of instructional delivery and allowed the necessary content to be covered, time limitations notwithstanding. These studies indicated that flipped instruction may afford instructors the capacity to deliver additional content more efficiently, which may be especially beneficial for those who struggle to cover content during allocated course time.

Student Achievement and Flipped Instruction

Significant Achievement Gains. Use of the flipped learning approach is associated with increases in students' academic achievement (e.g., Pierce & Fox, 2012) and may be particularly advantageous for low-performing students (Day, 2018). Multiple studies report that students scored significantly better on quizzes and exams when enrolled in courses that apply flipped instructional methods. Exam scores from students enrolled in a flipped learning section of a remedial university library instruction course improved at double the rate of students receiving traditional remedial instruction (Rivera, 2015). Similar outcomes were described in another study in which graduate-level students enrolled in a flipped physiology course performed an average of 12% better on exams than students exposed to traditional iterations (Tune, Sturek, & Basile, 2013).

Vaughn's (2014b) study of flipped instruction in a university instructional physical activity course identified significant pretest to posttest gains in students' health-related fitness knowledge, indicating that students were better able to learn via e-learning systems in an instructional physical activity course. Results from these studies demonstrated that students are capable of learning content via online asynchronous instructional delivery in classes that apply flipped instructional methods.

Insignificant Achievement Gains. Although ample evidence demonstrates students' positive academic outcomes as a result of the flipped learning approach, some studies have reported insignificant differences in academic achievement between students in flipped classes and their counterparts who received traditional instruction (e.g., Galway, Corbett, Takaro, Tairyan, & Frank, 2014; Love, Hodge, Grandgenett, & Swift, 2014). Students who engaged in flipped learning during these studies received online instruction and participated in corresponding in-class active-learning opportunities. Students receiving traditional instruction learned through in-class lectures and completed homework independently, outside of class. Academic performance was similar in the flipped and traditional instruction groups, indicating that simply flipping a course does not guarantee improved student achievement. These results, however, imply that flipped learning does not inhibit student learning and academic performance. Several key observations from the aforementioned studies offer insight into why flipped instruction may not result in improved achievement for all students and indicate that learner preferences may be a primary influence of student achievement in a flipped course.

There is some evidence of gender achievement disparity in flipped courses (e.g., Hotle & Garrow, 2016). The likely reasons for the gender disparities in academic performance were related to differences in learner preferences. Learners' characteristics and dispositions toward learning (e.g., motivation, capacity for

self-directed learning, tech savviness) vary widely. Evidence suggests that the disparities in academic achievement in flipped courses may simply be related to students' learning preferences and their ability to adapt to flipped learning (Gannod, Burge, & Helmick, 2008; Newman, Kim, Lee, Brown, & Huston, 2016).

Student Perceptions of Flipped Instruction

Flipped instruction is an emerging approach to teaching in higher education. Therefore, it is important to understand students' perceptions of the model to improve the design and optimize the impact of flipped learning experiences.

Positive Perceptions. Overall, students have a generally positive perception of flipped learning (Bishop & Verleger, 2013). Studies report a variety of reasons for which students have affirmed the flipped learning approach, including unlimited access to online instructional content (Enfield, 2013). Researchers also noted that students in flipped classes can watch the instructional videos multiple times (Mason et al., 2013) and appreciated the ability to pause, rewind, and review the content (Love et al., 2014; Schultz, Duffield, Rasmussen, & Wageman, 2014), perhaps a key reason for higher student achievement in many studies examining flipped instruction.

Students identified the ability to self-pace during online instruction as a key reason that flipped learning helped them learn more than listening to in-class lectures (Gilboy, Heinerichs, & Pazzaglia, 2015; Hotle & Garrow, 2016). It assisted their learning process (Pierce & Fox, 2012) and provided a more satisfying learning experience (Hung, 2015). Students attested that the online content was more engaging (Enfield, 2013; McLaughlin et al., 2013), the self-directed nature of the asynchronous learning requirements was more flexible (Forsey, Low, & Glance, 2013; Hao, 2016), and the flipped learning approach promoted autonomy (Yeung & O'Malley, 2014). Students also noted that learning content prior to class via online instructional delivery made class time more enriching (Tune et al., 2013), improved their preparedness for class (e.g., Lee, Burgeson, Fulton, & Spain, 2007; McCallum, Schultz, Sellke, & Spartz, 2015), and increased their ability to stay up to date with course content in the event of absences (McLaughlin et al., 2013; Schultz et al., 2014). Rivera (2015) observed students accessing and reviewing the online instruction on their mobile devices during in-class activities. Students in that study, who spoke English as a second language, engaged in the practice most often, revealing the added in-class learning support of consistent access to online instruction as an unexpected benefit of the flipped learning approach.

Students also indicated general positive perceptions about the in-class active learning that occurred in their flipped learning courses (Hao, 2016; McLaughlin et al., 2013). Increased access to their instructors during applied practice activities was one identified advantage of the approach (Galway et al., 2014; He, Holton, Farkas, & Warschauer, 2016), as opposed to traditional applications through homework without access to the instructor. In addition, students reported their appreciation for extra personal interaction with their instructors (Galway et al., 2014) and improved group collaboration with classmates (Schultz et al., 2014; Strayer, 2012). These studies demonstrated that students recognized how both the asynchronous instruction and the in-class active learning supported their development. Positive student perceptions, particularly about the asynchronous aspect of the flipped instructional approach, provide key insights into the areas of the approach that may best support student learning.

Negative Perceptions. Negative student perceptions related to the online content are also reported. A pattern of difficulties emerged related to the preclass, preparatory requirements of the flipped learning approach (i.e., watching videos, viewing PowerPoints, identifying areas of confusion). Students in one study, for example, believed that watching the online videos was voluntary. Consequently, they noted that their frustrations with flipped learning stemmed from a misunderstanding of the instructional approach (Yeung & O'Malley, 2014). Another problem related to the novelty of flipped learning was students' reported difficulty remembering to watch the videos (Hotle & Garrow, 2016; Newman et al., 2016). These difficulties reinforce the importance of guiding students during their initial interactions with flipped learning, and e-learning more broadly, in order to support their success as the course progresses.

Some criticism has been aimed at the extended length of the instructional videos (Enfield, 2013) and the perceived negative quality of the videos (He et al., 2016). Students reported an unwillingness to preview material before class and a lack of motivation to engage with the online content when the material became more difficult (Hao, 2016), which perhaps speaks to the importance of high-quality, engaging videos with regard to student motivation and content engagement. Students in one flipped class suggested that the increased expectation for engaging with content outside of class was unfair (Wilson, 2013). Other students perceived that the required workload was beyond the credit hours awarded for the course (Tune et al., 2013). In response to these issues, flipped learning should be time neutral compared with the homework load of traditional courses (Prober & Khan, 2013).

Students also recognize that not all of their classmates engaged with asynchronous instruction before class, as evidenced by their lack of preparation and contribution to the in-class active-learning assignments (Gilboy et al., 2015; Hao, 2016). Corresponding reduction in quality of in-class active-learning assignments was a fundamental frustration for other students when classmates neglected to prepare (McLaughlin et al., 2013). The absence of an instructor during foundational learning was a point of hindrance, as some participants have testified (Gilboy et al., 2015; Schultz et al., 2014). Those students suggested that a blended learning approach would be more helpful, whereby online content would introduce basic content and the more complex content would be covered in class so that individuals could ask questions in real time (Schultz et al., 2014).

These issues reinforce the importance of preparing high-quality online content that aligns well with in-class activities in order to maximize engagement and motivate students to prepare for class by watching the videos consistently. Accountability measures (e.g., regular quizzes) should also be implemented by instructors to reinforce the importance of preparing for active learning. Participants supported this and identified accountability quizzes as a key motivating factor of the flipped learning approach (Tune et al., 2013)

Students perceive the value of flipped learning approach in classroom environments. They appreciate online instruction, in many instances, and understand the significance of active learning in the classroom. Negative perceptions seem to stem from students' individual learning preferences and design and implementation flaws (i.e., lackluster online content or poorly conceptualized in-class activities) and may be prevented during the development of flipped learning units. It also appears that participants' initial frustrations with the flipped learning approach ameliorated over time in several studies (e.g., Mason et al., 2013; Tune et al., 2013), and many of the negative perceptions were associated with specific

aspects of the flipped instruction implementation and not the overall model.

Implementing Flipped Instruction in a Physical Education Teacher Education Course

A primary goal of the University of Illinois physical education teacher education (PETE) program is to provide high-quality learning opportunities that promote positive socialization into the physical education teaching profession. Our desire is that the courses in which PETE students participate result in deep learning about the knowledge, skills, and dispositions necessary to teach and promote physical literacy in the P-12 population. One challenge is that the PETE curricula, like most other programs nationally, contains a profusion of content with a paucity of time to deliver it (Ayers & Housner, 2008), given the general education, teacher-certification course requirements, and core content requirements. This reality, combined with the need to provide students with high-quality field internships, creates a difficult barrier to overcome in the current physical education teacher education context. Thus, flipped instruction was integrated into an early physical education teacher education field experience course to provide added field time for preservice teachers and to promote an active-learning approach. The documented positive impact that flipped instruction can have on course structure, student learning, and student perceptions served as rationale for redesigning the course using a flipped model.

Course Description

Kinesiology 361: Curriculum in Grades K-6 was redesigned to include flipped instruction during the fall 2017 semester. The purpose of this course is to provide preservice physical education teachers with theoretical and philosophical principles necessary to design and implement a high-quality physical education curriculum for elementary-age students. In addition, preservice teachers learn to develop safe, accessible learning environments; manage students; and deliver content effectively and efficiently to ensure that their students have good physical education experiences. A key learning outcome involves these preservice teachers' planning developmentally appropriate lessons and implementing them during field visits to a local elementary school.

Prior to the course redesign, content was delivered primarily through a traditional lecture format with preservice teachers periodically engaging in small-group activities and peer-teaching exercises. Instructors formally assessed preservice teachers' knowledge using two exams, formative lesson plans, and a final curriculum project. Two initial observational visits and a hands-on experience assisting with a school-wide physical activity event were embedded into the course. These were intended to provide preservice teachers with introductory opportunities to observe physical education taught in an authentic environment and to support their preparation for teaching experiences later in the semester.

Course Redesign

The decision to flip this course was made in an effort to increase the amount of time that preservice teachers spend in authentic field experiences (Gurvitch & Metzler, 2009) and provide them with more space for meaningful discussion and reflection (Vaughn, 2014a). The structure of the new course involved preservice teachers' engaging with online content over the weekends, visiting a local school to observe and assist a cooperating physical education teacher on Tuesdays, and then participating in reflective on-campus seminars on Thursdays. The course maintained this structure through the first 9 weeks of the semester. During the final 6 weeks of the semester, the preservice teachers delivered their own content to the K-5 students on Tuesdays and Thursdays as part of culminating practice-teaching opportunities, which aligned with previous nonflipped iterations of the course.

Twelve preservice teachers were enrolled in the initial flipped version of KIN 361. The entire cohort was in the third year of undergraduate studies, and all students except one were enrolled or intended to enroll in the physical education teacher education program at the university. Course feedback was collected after the semester to understand preservice teachers' perceptions of participating in a flipped field-oriented physical education teacher education course.

Learning Foundational Content. Lecture content was offloaded to the online university blackboard site, Compass2g, using PowerPoint presentations with embedded audio. Each traditional lecture was consolidated to a 15- to 30-minute PowerPoint presentation that preservice teachers could navigate at their own pace. These presentations included audio lecture, as well as supplemental links and videos, which preservice teachers were encouraged and required to navigate and view. Each lecture was paired with a chapter from the textbook, and preservice teachers were encouraged to read chapters prior to viewing the presentations. Embedded in each presentation were 3–5 questions constructed to assess the preservice teachers' understanding of the assigned content and prompt reflection. Questions were presented verbally during the lecture, not listed in written form, to discourage preservice teachers from simply navigating to the questions without engaging with the audiovisual portion of the presentations. The purpose of these assessments was twofold. First, they were applied as an accountability measure to ensure that preservice teachers completed each module. Second, and perhaps more important, the embedded assessment questions were designed to prime preservice teachers for the subsequent observation and seminar. Preservice teachers were expected to complete and submit each module and corresponding assessment reflections by noon each Monday, which provided the instructor ample time to review their understanding of the content prior to the seminar discussion on Thursday.

Preservice teachers had generally positive views of the online modules. For example, one wrote, "I absolutely loved how this class went and how we did the flipped instruction. I feel like I was more prepared for this class because of the way it was run and I learned more this way." Preservice teachers also appeared to appreciate the fact that the content was posted online because it allowed time for preparation for field observations and seminar. The combination of online content and embedded assessment questions also, according to another preservice teacher in the class, forced students to review material before class: "Typically students are supposed to do that for any class but barely anyone does—I know I never do."

One critical observation was made early in the semester during an informal feedback session by a preservice teacher who requested more pictures and videos to supplement the PowerPoint text. This was an important reminder to be intentional about creating engaging and appealing online content.

School Visits. Each Tuesday the cohort of preservice teachers visited a local K-5 school to conduct observations that required

them to identify and analyze authentic elementary physical education situations related to the content presented during the online module. The structure of the Tuesday school visits involved half of the class members completing parts of their observation packets while the other half assisted the physical education teacher with her lessons. The two groups would ultimately change roles so each group had approximately 45 minutes to observe and 45 minutes to assist during the visits. Preservice teachers completed additional assignments in their packets after the visits and used their observation notes during the Thursday seminar discussions.

Tuesday school visits provided time for preservice teachers to assist the cooperating teacher with her lessons and interact with the students they would be teaching later in the semester. Redesigning KIN 361 enabled the preservice teachers to visit the school five additional Tuesdays during the first 9 weeks of the semester. This translated into 7.5 hours of additional school-based hours than preservice teachers had previously received. The extra school-based time provided preservice teachers opportunities to augment their relationship with the cooperating teacher and learn from her between classes and at the culmination of the site visits.

The cohort had increased opportunities to acquire a deeper understanding of the physical education class environment and management routines, helping them to more effectively align their teaching with the K-5 expectations. Preservice teachers were also able to engage in additional guided teaching practice by assisting the cooperating teacher during the expanded field visits. Each of these outcomes resulted from added time spent in the school and served to better prepare the preservice teachers before their own teaching experiences.

These Tuesday school visits served to ground the module content during the lecture days in a genuine physical education context, rather than discussing the material using strictly case-study examples or personal reflections from preservice teachers' own elementary physical education experiences. Additional observations resulting from the use of flipped instruction served to promote more robust discussion and reflection during seminars and ultimately lead to deeper learning for the preservice teachers.

Seminars. Preservice teachers were provided time during each Thursday seminar to debrief what they observed and experienced with their peers in relation to what they learned about best practice from the online modules. A more structured large-group discussion was usually conducted after the initial period of reflection to highlight key scenarios that had occurred during the visit. This aspect of the seminar also served to reinforce aspects of the material that the preservice teachers might have misunderstood or needed to refine, as illustrated by their reflection assessments of the online modules.

It appeared that the preservice teachers had an improved conceptualization of the course content supported by the authentic, personal observations and experiences resulting from the extra time spent at the school. The majority of their course feedback focused on the seminar aspect of the course. They valued feeling more prepared for seminar as a result of viewing the online modules. As one preservice teacher shared,

> I liked how it was an open discussion every class. It made it easier to learn and pay attention, especially coming into class already knowing what we were going to talk about. Also I feel like it was easier to participate in class because we learned about the topics before. I wasn't as nervous to talk or ask questions because I was prepared for class by having watched the lecture before class.

Other preservice teachers spoke to being more engaged during seminar due to the active nature of the discussions. Flipped instruction, one said, "allowed for us to be more interactive in the classroom instead of sitting bored while being lectured to." These views align with the "antilecture" perspectives of many millennial students and emphasize the potential of flipped learning in a physical education teacher education context.

Conclusions

Using technology purposefully and intentionally to optimize teaching and learning opportunities in a physical education teacher education course resulted in substantially more observation time and scaffolded practice-teaching opportunities for preservice teachers. Such served to ground understanding of course content in authentic experiences and prepared the students more for their early teaching experiences. Flipped instruction could be applied in other field-based, clinical, or laboratory kinesiology courses to expand observation and active-learning opportunities (Elmer et al., 2016) and improve student perceptions and achievement. Flipped instruction may be of particular interest to faculty and instructors who experience time restraints, given the capacity of the method to increase the efficiency of content delivery and improve student engagement during class.

As the college student population continues to evolve, it will be important for faculty and instructors to continually evolve their teaching methods, as well. Given the characteristics of millennial students and their preference for technology integration and experiential learning, flipped instruction may be an effective teaching method to meet these students where they are and accommodate their learning preferences.

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