Plickers: A Formative Assessment Tool for K-12 and PETE Professionals

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Assessment in physical education is essential yet difficult to accomplish. The need for improved assessment systems in physical education is a major priority to measure the achievement of standards and decrease marginalization (Collier, 2011). Hensley, Lambert, Baumgartner and Stillwell (1987) long ago recognized the importance of assessment for the field of physical education: “It is likely that the survival of our profession may, to some extent, depend on the efficacy of our measurement and evaluation effort” (p. 61). Despite the importance and prominence of assessment in schools, it has been difficult to implement in physical education due to the many barriers that exist, such as large class sizes, lack of time, and challenges with record keeping (Gallo, Sheeny, Patton, & Griffin, 2006).

Lund and Veal (2013) recommended gathering both summative and formative assessment data related to the three domains of learning in physical education (i.e., psychomotor, cognitive and affective). Summative assessment is an indication of student learning that is often used to determine grades, while formative assessment is used for student learning and to inform future learning experiences. As the field of physical education continually becomes more aligned with a standards-based curriculum model, formative assessments also become imperative in providing information to teachers about quality of instruction and progress toward achieving state and national standards in the classroom (Fisette & Franck, 2012; Lund & Tannehill, 2010). Because formative assessments tend to be an ongoing measure of student progress over a period of time, the diversification of these assessments can be helpful in achieving diverse student learning abilities (Wuest & Fisette, 2012).

Traditional sources of assessment data in physical education have included skill and fitness testing, written exams, and surveys to address the three domains of learning. These methods have traditionally lacked enthusiasm from physical educators due to the barriers described earlier. The great news is that new methods of collecting student data have emerged, with the help of advances in technology. One of these advances includes the use of classroom response systems (CRS).
Classroom response systems are used to poll students and gather instant feedback in response to questions asked by the teacher (Deal, 2007). A nontechnical example of a CRS is a teacher asking students to give a thumbs-up or thumbs-down to respond to a question. Traditional electronic CRSs allow students to respond to questions by selecting an answer on a remote or clicker, and the responses are sent to a central location on a computer or website, where the teacher can view whole-class and individual student responses. Response graphs can be immediately projected for the whole class to see, if desired. Other web-based CRSs allow students to use smartphones, tablets or computers to respond to questions, such as Poll Everywhere (www.polleverywhere.com) and Top Hat (www.tophat.com), which use texting or web-based polling systems for attendance reporting and student questioning. There are many different options for CRSs that vary in price, from free to thousands of dollars for site licenses (Social Compare, 2015). Research suggests that using a CRS can result in greater student engagement, more responsive teaching practices, and enhanced learning in traditional classroom settings (Chien, Chang, & Chang, 2016; Kay & LeSage, 2009).

Though these systems have been shown to be effective in classroom-based instruction, there are drawbacks to CRSs when implemented in a physical education environment. Because CRSs have typically required the use of cumbersome equipment or a smartphone or tablet, it has been difficult for students in physical education to manage the equipment in such an active environment. In addition, remotes and clickers can be too costly for the common budget allocated for physical education departments. Recent reports have indicated that 73% of teenagers have access to smartphones (Lenhart, 2015), yet they are often banned from use in schools and there is always the fear that they will be damaged in an active physical education class. While technology-infused assessment seems to be at the forefront of the pedagogy discourse, there is one application (app) platform that is cost- and time-effective, emphasizes formative assessment methods, and is easy to use with minimal technology. Say hello to Plickers!

Plickers (https://plickers.com) is a free CRS app available for Android and Apple users to collect formative assessment data from students in seconds, without the use of burdensome equipment. While most CRSs require students to have their own equipment (e.g., clicker or smartphone), Plickers only requires the teacher to have a smartphone or tablet. Because 64% of all U.S. adults own a smartphone (Pew Research Center, 2015), this app would likely incur little or no extra cost. Students, on the other hand, need no technology to participate. Rather, all they need is a piece of paper, called a Plickers card, which is downloaded and printed by the teacher. The following sections provide an overview of the Plickers system and how it can be implemented in physical education settings.

How Does It Work?

The process of familiarizing oneself with the Plickers app, website and assessment card does take a short amount of initial set-up time, though the ease of use becomes apparent once applied in a classroom setting. The following steps provide an overview of how to start the initial set-up and organization of the Plickers system:

1. **Choose assessment content.** Prior to using Plickers in a physical education class, the teacher must determine what should be assessed and how the assessments fit into the lesson plan. Assessments should be aligned to standards-based instruction and address the three domains of learning in physical education.

2. **Download and access Plickers.** Teachers must download the free Plickers app for their mobile device or tablet. Upon downloading the app and creating a free account, the teacher may access the Plickers platform from a mobile device or computer. For example, a teacher may use Plickers to ask exit questions at the end of the lesson, and the results of the questions asked will appear instantly on the mobile device and will be synced with the same account on www.plickers.com.

3. **Print off Plickers cards.** Within the Plickers website (www.plickers.com/cards), a teacher can print off the unique Plickers cards. The Plickers cards have a number and a unique visual code that has four sides, each with a small letter: A, B, C and D (Figure 1). Each card will be assigned to an individual student, and the program matches students with their assigned cards. The same set of cards can be used for multiple classes, so only printing off one set is necessary. For example, Plickers Card 3 may be assigned to six different students, all in different classes.

![Figure 1. Plickers card](image)
4. **Set up classes in Plickers.** The most time-consuming part of the Plickers process is setting up one’s classes in Plickers. This process can only currently be done on the Plickers website on the Classes page. Within the Classes page, the teacher creates a new class section (e.g., Mrs. Rockwell’s Fifth-Grade Class) and manually enters each student within that class (Figure 2). Plickers will allow up to 63 students per class. Once a class is set up on the website, it is automatically synced to the teacher’s mobile device or tablet.

5. **Add questions on the Plickers website or app.** Once classes are set up, the teacher may add questions to his or her own personal question bank. Any question added to the question bank may be used for all classes. So once the teacher adds a question, the process does not need to be repeated. Questions in Plickers may be multiple choice or true/false, and the teacher also has the option to add images to accompany the questions. One of the benefits of using Plickers as a formative assessment tool is that it can be planned ahead of time or done on the fly within a lesson. For example, Mr. Jones may know the exact exit competency questions he wants to address at the end of his lesson. He can pre-plan his assessment and add his questions to the app (or website) prior to the class. Or Mrs. Fleming may see that her students are really struggling with a skill that should have been previously mastered. Going off the script of her lesson plan, she may decide to have her students get their Plickers cards for an impromptu review session. Mrs. Fleming can quickly add a few checking-for-understanding questions to her Plickers app on her mobile device and poll students on their prior knowledge of the skill.
6. **Scan class responses.** Once questions are in the Plickers system (app or website), it is time to assess students. The teacher starts off by using the Plickers app within the mobile device (or tablet) to select a class, and then selects the question to ask. The teacher poses the question and the students hold the cards with their preferred answers on top (Figure 3). The teacher then uses the camera icon in the Plickers app to scan the room. The Plickers app reads the cards and records each individual student’s response, in addition to whole-class data.

7. **View results.** The results are displayed immediately on the teacher’s device (Figures 4 and 5). In addition, the results can be accessed on a computer connected to the Plickers website (Figure 6). The teacher may also choose to project results on a large screen on the gym wall for the class to view. Results are then stored and can be tracked over time to examine individual student or whole-class progress.

Compared with traditional thumbs-up/thumbs-down or hand-raising assessments, the Plickers/CRS method allows teachers to obtain and keep a record of each individual student’s response. In addition, because the letters on the cards are so small and each card has a unique visual code, students cannot see one another’s answers. This helps students to make their own decisions without looking to see how their peers are responding, and eliminates the fear of making the wrong choice or not going with the whole group. The instant feedback provided with this app allows the teacher to quickly identify students who may need extra support, as well as those who may be ready for the next challenge (Smith & Mader, 2015). It can be used...
not only to gauge cognitive understanding of the subject matter, rules or directions, but also to assess the affective domain with questions related to attitudes, feelings and values, and the psychomotor domain with self-reported skill evaluations.

User Considerations

A few issues should be considered with the use of Plickers in physical education. For one, the number of responses is limited to four (i.e., A, B, C and D), and closed-ended, lower-order thinking questions are the primary type of questions that must be posed. In addition, lighting seems to be a factor in how well the app is able to read the cards. Laminating the cards seems like a good idea to keep the cards more durable; however, glare can be a problem. It is recommended that the cards are printed on a thick cardstock so that they can be used for a longer period of time, but they will need to be replaced eventually. The Plickers website also recommends that teachers go to Amazon (www.amazon.com) to purchase a premade set of 40 laminated cards (5.5-inch square).

Plickers is a system that can work either online or offline and can be as easily used in the gym (with or without Wi-Fi access) or outside. To maximize the usefulness of the Plickers system, online connection with Wi-Fi access is recommended so that data can be immediately synced to the Plickers account and be viewed live by students and teachers alike. Plickers cards can also be scanned offline through the mobile app, making it useful for physical educators to receive instant formative feedback. When educators poll students with Plickers cards offline, data are stored on the mobile device and later synced when the mobile device returns to Wi-Fi.

On Plickers, all data (i.e., questions, answers, student information, etc.) are stored through the online service. To protect privacy and security, users establish a unique password to access their accounts. Plickers does collect analytics data to measure traffic and usage trends but does so in aggregate form so as not to identify individual users. As with any online program, it is recommended that to protect students, minimal information is entered into the system. Using students’ first names and last initial only is suggested. Plickers allows users to export data into a spreadsheet (i.e., .csv file), where teachers can edit or add more sensitive student details (e.g., last name, identification number, etc.). Overall, the Plickers program is not meant to store and manage sensitive or protected data, but rather, it is an assessment gathering tool.

Managing the Plickers cards is simple and is a great opportunity for teachers to demonstrate creativity that results in improved classroom management. A teacher could have a class set, and each card is assigned to a student within the app. Cards can be placed in an easily accessible location in the gym, such as secured to a board on the wall with Velcro. Each card is labeled with the student’s name or number. Students can pick up their cards upon entry to class to use for a quick “walk and talk” review session, or they can take their cards mid-lesson to answer a question and return them to the board afterward. It can also be used as an entry review assessment at the beginning of class or an exit assessment (similar to an exit slip) at the end of class. Plickers can be used with elementary, secondary and even higher education students. The following sections will discuss examples of using Plickers in K–12 and physical education teacher education (PETE) settings.

Using Plickers in K–12 Physical Education

Plickers can be used in K–12 physical education settings in a variety of ways. Plickers can be a great tool not only for assessing content knowledge, but for polling students based on their motivations, values and perceptions toward content and classroom-specific social interactions. In addition, they can be used to monitor daily progress and attendance. Using Plickers, students can take their assigned card off the wall (or other storage method) and answer a daily “check-in” question. This question would ideally be linked to content from the previous lesson and can let the teacher know whether they need to review essential concepts, reteach them, or move forward with the lesson progression. This two-in-one assessment method cannot only check student understanding of previous content, but with one five-second scan, teachers can check daily class attendance. Teachers can go back into the Plickers app after the
class is over to check which students were present to answer the “check-in” question.

Other applications of Plickers will vary based on the grade level of the students. Elementary- and secondary-level students can all benefit from the use of Plickers in physical education. Using a CRS, such as Plickers, in elementary classrooms has been shown to contribute to student learning outcomes and attitudes toward learning, which is important for early learners (Scott, Fahl, Fark, & Peterson, 2014). As students enter middle school and high school they begin to reach physical maturity with higher levels of motor ability, have a stronger drive for independence, and are highly linked to peer groups (Buck, Lund, Harrison, & Cook, 2007). As secondary school students continually work toward becoming independent young adults, it is important that their voices are heard in physical education class. Plickers then becomes a great tool for completing formative assessments based on student perception, motivation, confidence and personal values. Student-centered questions, designed by the teacher or the students, help keep the class connected to the content, and thus, students can achieve greater comprehension of the material. In addition to the general physical education class, students with special needs may also benefit from the use of Plickers as it provides an alternative way to demonstrate knowledge other than traditional oral or written exams and gives students who need it extra time to respond. Table 1 provides examples for using Plickers in K–12 physical education settings.

Table 1. Sample Uses for Plickers in Physical Education

<table>
<thead>
<tr>
<th>Domain of Learning</th>
<th>Sample Formative Assessment Tasks</th>
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<tbody>
<tr>
<td>Psychomotor</td>
<td>Have students identify which cues they are struggling with most on a particular skill (e.g., volleyball forearm pass — [A] ready position, [B] flat arms, [C] not swinging the arms, [D] none of the above). Have students report their rate of success on a given skill task (e.g., consecutive strikes against the wall using a racquet/paddle; number of jumps completed in 60 seconds). Ask students to gauge their skill ability related to a particular topic (e.g., [A] I could teach it; [B] I could show it; [C] I can do it, but I make mistakes; [D] I am still learning).</td>
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<tr>
<td>Cognitive</td>
<td>Put four example SMART goals on a board and ask students which one is . . . specific, measurable, achievable, results-focused, time-bound. Ask students to choose activities (Plickers choices) that are most closely related to different components of health or skill-related fitness. Take turns having different groups come up with Plickers questions that they want to ask the rest of the class based on the material.</td>
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<tr>
<td>Affective</td>
<td>Ask students to assess how their group worked together today. Provide a small scenario/case specific to the content with four possible ways to remedy it. Have students choose what they perceive to be the best course of action. Follow up with a class discussion. Poll students based on what motivates them to . . . [A] do cardiovascular fitness exercises; [B] join school sports teams; [C] do physical activities with family/friends, etc. Ask students how much they enjoyed the activity of the day or which activities they are most interested in trying in future lessons.</td>
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<tr>
<td>General</td>
<td>Ask students to assess their perceived exertion for a specific lesson/activity (e.g., [A] extremely hard, [B] hard, [C] somewhat hard, [D] light). Ask students to report how many days last week they participated in 60 minutes or more of moderate-to-vigorous physical activity or how many servings of fruits and vegetables they consumed the previous day.</td>
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Using Plickers in PETE

There is no getting around the fact that university students thrive on technology and mobile interaction and are often even more technology savvy than some faculty (Dahlstrom, Walker, & Dziuban, 2012). Integration of Plickers within PETE coursework is as much about formatively measuring content knowledge as it is about exposing PETE students to educational assessment tools and what to do with the data once collected.

Physical education teacher education faculty can use Plickers to help liven up traditional teacher-centered lectures. Checking for understanding can easily be done by inserting random multiple-choice questions in between lecture slides to help engage PETE students in the lesson. Many lectures have a clear turning point within them, and using the real-time feedback of students can help shape the rest of the lecture. Faculty can also display the anonymous results of the questions to create a lively class competition environment. In addition, review days can be set up in a game-show fashion where students come up with questions that can be asked to the whole class (e.g., partners create five review questions each and submit them to the instructor, the instructor uses the review questions to poll all partner groups, and points are awarded for each correct answer).

Using Plickers in a PETE program is a great way to get PETE students involved in both the technology and assessment processes. When adopting the Plickers tool in a PETE program, undergraduates should be required to complete the process on their own from beginning to end (e.g., enter classes and students, create and evaluate questions and responses). A great way to practice this is in a peer-teaching or pre-student-teaching practicum experience. For example, Samantha is an undergraduate PETE student who is doing a task presentation for her peer-teaching experience to a group of 10 students. Samantha could use Plickers to poll students at the end of her lesson about their content knowledge or other measures specific to the lesson objectives. In addition, peer-teaching environments are a great way for PETE students to obtain formative feedback so they can grow as teachers. Samantha could use Plickers to poll her peer group with questions related to her teaching performance (e.g., strengths and weaknesses). The benefits of doing this through Plickers are that Samantha can go back to the quantitative data obtained from her peers at a later date to reflect on her teaching experience.

Conclusion

With assessment’s prominence in education and the need to overcome barriers to assessment in physical education, the use of a CRS may help teachers better assess student learning. Plickers offers a viable option, because there is no need for one-on-one technology, no need to share devices, and no need for a big budget. One device for the teacher, the free Plickers app, a stack of paper and a little planning will do the trick. Plickers provides an easy alternative to traditional CRSs suited for K–12 physical education and PETE settings.

References


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