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In this column, we explore the issue of teachers and technology—not just as it relates to CALL solutions, but also to Internet, software, and hardware concerns that all teachers face. We invite readers to submit articles on their areas of interest. Please contact the editor before submitting.

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## Dopamine, Language Learning, and Having Fun with *zondle*

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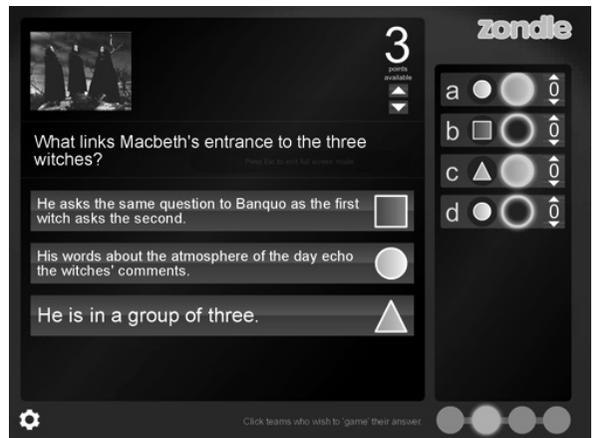
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This article explores the different uses of the Web 2.0 tool, *zondle* <<http://www.zondle.com>>, in the K-12 and higher education classroom, as well as its pros and cons. Zondle is a game-based learning platform designed to help students study, review, and remember information. It also allows students to produce their own topics to create a personal learning environment.

Originally, *zondle* was free to use, so this made *zondle* a practical option for teachers to invest their time in by integrating the website's competitive game-based learning into their curriculum. However, in July 2015, the website had to start charging a fee of \$US8 per month or \$US80 per year. Despite the fees to use the tool, the principles behind it still make the tool worthy of consideration. Zondle focuses on prediction error and dopamine release to create an ideal setting for learning (zondle, n.d.-a). By integrating uncertainty into a learning task, students' affective responses are influenced significantly (Howard-Jones & Demetriou, 2009).

### Practical Uses

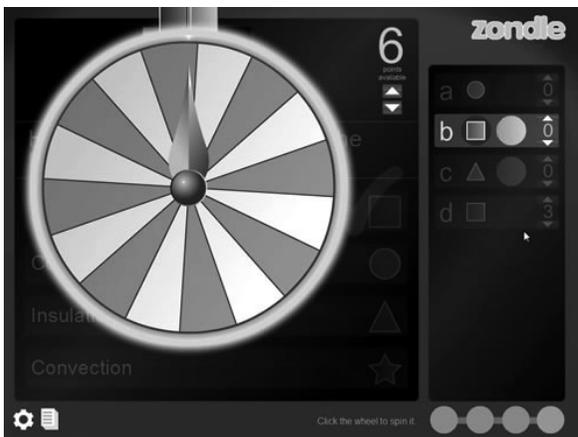
Teaching with immersive gaming (TWIGGING) integrates learning and gaming skills into a lesson, switching between learning content and gaming rounds so quickly that students feel engrossed in a gaming environment (Howard-Jones, 2010). TWIGGING demonstrates that there is no clear relationship between learning and reward. If you give a child three points today for good work and give them ten points tomorrow, it does not double the likelihood of them remembering the information being taught. Contrary to this, there is a clear relationship between the brain's response to reward and learning (Howard-Jones, Bogacz, Yoo, Leonards, & Demetriou, 2011).



**Figure 1. Zondle question interface.** This interface shows the current question and answer choices at the front of the classroom using a projector or screen. The section on the right side includes letters that indicate the teams, their answer choice, and whether or not they chose to wager their points (zondle, n.d.-b).

Dopamine is a neurotransmitter that is essential to the brain's reward system, and as such, is linked to learning (Willis, 2011). Higher activity in the mid-brain dopamine reward system results in improved recall performance (Callan & Schweighofer, 2008; Howard-Jones, Demetriou, Bogacz, Yoo, & Leonards, 2011). Zondle Team Play is a game that can generate

higher levels of dopamine production connected with uncertain rewards (zondle, n.d.-a). Team Play exploits the relationship between the brain's reward response and learning. To begin, for every couple of conventional content slides created by the teacher, he or she creates a couple of game slides with questions (see Figure 1) that call for students to synthesize the learning. In class, dyads or small groups log into zondle via their mobile devices. Each group chooses a letter that represents them—the teacher can allow this to be anonymous or not—and the learning activity begins. As the teacher moves through the content and game slides, he or she can provide immediate and corrective feedback on answer options just before a wheel of chance is spun (see Figure 2). This combination of rising anticipation and feedback creates teachable moments suitable for scaffolding student learning with maximum effect. After feedback is complete, the wheel of chance is spun and students await the results. If the wheel lands on a certain color, students win double the number of points the question was worth. If the wheel lands on the wrong color, students lose and receive zero points even though they got the question correct. The lesson progresses, switching between content and game slides, until the end of the activity. In addition, zondle Team Play allows for the random selection of teams for particularly demanding challenges that should have a higher likelihood of failure than normal, but correspondingly provide for higher rewards for correct responses. Additionally, Team Play incorporates bonus and head-to-head rounds to add to the gaming environment. Zondle Team Play stimulates the brain's reward system leading to increased learning outcomes (Adcock, et al., 2006; Shohamy & Adcock, 2010; zondle, n.d.-a).



**Figure 2. Zondle wheel of chance.** Students have an opportunity to wager their points. This 50% chance of doubling players' points or losing them altogether

er results in maximum dopamine release due to prediction error (zondle, n.d.-c).

Other practical classroom uses for zondle are individual play and a quick-style of challenge. Individual play works best in a PC lab because zondle requires flash-enabled browsers. The teacher assigns a topic of study and then the students pick one of several different flash-based video games from zondle's library to play. Upon answering a question correctly, the student has a roughly 50% chance of being allowed to play a short round of the game they selected. The uncertainty of the reward of being able to play a game is introduced and thus increases dopamine release; research has tied this to improved learning outcomes (Callan & Schweighofer, 2008; Howard-Jones, 2011; Shohamy & Adcock, 2010; zondle, n.d.-a). Once the short flash game is played, the student then continues studying and the process is repeated. Teachers can track the progress of their students during individual play, and if a teacher notices that several students are missing a certain question, the teacher can stop all play and use it as a teachable moment before students continue with individual play. After three sessions using the software, a survey conducted by two of the authors with 56 students at a Tokyo junior high school found that this style of game play with zondle was extremely popular; the students unanimously reported that they enjoyed zondle and wanted to use it again.

Lastly, a teacher can use zondle as a student response system in the zondle challenge mode. This is a lighter version of zondle Team Play, except there is no gaming aspect where students have an opportunity to gain double points. In the zondle challenge mode, students can participate from any device that is connected to the Internet. After all of the students register their devices through the zondle website in their browser, the teacher displays a question and the students are prompted to answer the question, and then the participants can receive immediate feedback.

### Pros and Cons

Zondle is no longer free, so the user has to pay to use the site. Zondle also comes with a learning curve and some people might find the interface to be cumbersome, but with video tutorials, the site is manageable. The fact that it offers students real-time feedback along with formative and summative data is a valuable asset. Because it uses flash, the full website does not work on iOS devices and users have to download the app to their mobile device

which limits the question types and the number of games that can be played. Zondle offers thousands of free topics that other teachers have already created, which can then be modified, so this is a major advantage to using this Web 2.0 tool in the classroom. Finally, if a teacher wants to embed a zondle topic that he or she created into their classroom website or learning management system (Moodle, Blackboard, etc.), zondle generates an html code that can be easily copied and pasted into a variety of platforms.

## Conclusion

Zondle is a Web 2.0 tool for anyone to integrate collaborative game-based learning into lessons, and it utilizes prediction error and dopamine release to increase learning (Howard-Jones et al., 2011; zondle, n.d.-a). The program empowers students to study, review, and remember topics. Zondle can be used in three ways: student play, team play, and challenge. The authors' anecdotal experiences using zondle showed it to be popular with students. For more information on how to use this engaging and powerful site, please visit the zondle website and try it out in your own classroom.

## References

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**Editor's Note:** Zondle is but one of the many new game-based learning tools being used in the language learning classroom today. If you are using an engaging site or app with your students, consider writing about it for the *Wired* column. Contact the editor at the email address above to discuss any ideas you have for the column.

As we begin 2016, thoughts will be turning to this year's slate of conferences and professional events. The Call for Proposals for JALTCALL 2016 is ongoing now, so please submit a proposal to share your CALL experiences with the rest of us at Tamagawa University this June. See <<http://jaltcall.org/conference>> for details. Until then, be sure to continue to seek ways to keep your classrooms *Wired!*

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