



Yellowdig Usage and Relations to ASU Online Class Grade & Completion Outcomes

Philippos Savvides - EdPlus at ASU - Learning Technology Manager
Serah Ye - ASU Enterprise Partners - Director of Analytics & Insights
Brian Verdine, Ph.D. - Yellowdig - Head of Customer Success
Samuel Kampa, Ph.D. - Yellowdig - Customer Success Specialist

Purpose & Abstract

Yellowdig is a student engagement platform. When implemented in classes, as studied here, it is often used as an alternative to traditional, weekly discussion boards. The platform looks and behaves similar to modern social media. It has a single scrolling feed and allows the easy posting of links, images, and videos. It features familiar social media conventions like hashtags, the ability to @mention others to get their attention, and a robust notification system. It also features gamification elements, allowing students to earn points for interacting with each other. Overall, the system allows instructors to easily create vibrant learning communities that are more interactive, engaging, and satisfying than traditional discussion assignments. Though having a better experience has benefits in its own right, it is important to know whether interacting and engaging (i.e., having “fun”) translates to learning and student retention.

The purpose of this report is to explore the relationship between Yellowdig participation and course outcomes (grades & withdrawals). Through this partnership between EdPlus at Arizona State University and Yellowdig, we were specifically interested in pursuing 3 research questions: 1) Is greater participation in Yellowdig communities associated with better grade outcomes and improved course retention?; 2) Are there specific ways of interacting in Yellowdig communities that improve grades or retention?; and 3) Are there community settings or properties that propel student achievement and can inform our best practices and recommendations for future implementations?

The report is based on Yellowdig data matched to 20,737 student grades primarily from ASU Online classes run between March 2017 and December 2018.

The majority of students using Yellowdig achieved their course goal for points, with the top 25% of point earners exceeding expectations by over 15%. Most Yellowdig behaviors were associated with better grade outcomes, particularly the extent to which a student posted compared to their classmates, which had a correlation of .416 with grade. These correlations were even more pronounced in courses where the communities used more of Yellowdig’s recommended best practices. In particular, communities using the social point categories tend to have longer conversations between students (i.e., more comments per post). These same communities also tend to have higher levels of most activities and more students gaining points above and beyond the point requirement for a full participation grade.

Methods

ASU Grading & Grade Scale

As seen in Table 1, ASU's grading system proceeds from A through E with 10 grading tiers and A+ being the highest grade. For the purpose of analysis, A+ was assigned the highest code number (11) and withdrawals were included as the lowest grade tier (1). Data are sometimes reported throughout this document analyzing withdrawals as their own separate category. Unless otherwise specified, where we speak about retention for this dataset, we are always referring to whether students completed the course (i.e., got any grade) or withdrew.

Yellowdig Behavior Variables

Yellowdig collects detailed data on student interactions with the Yellowdig platform. These include actions like posting (Pinning & Commenting), receiving upvotes or upvoting other student posts (i.e., receiving or giving a Like or Love), and the amount and types of points they are collecting according to the community setup.

A number of the Yellowdig behavior variables are values derived through some calculation from the raw data, and these are defined below. Many of these take into account the behavior of other members of the community in which the student was participating. Things like community settings, instructor assignments, instructor interaction style, and point settings can have serious impacts on the overall "health" of the community with both positive and negative influences on individual students' behaviors. In many cases, a student's level of engagement and interaction is better understood not from their raw number of posts in a community but from their posting behavior relative to the behavior of others in their community. Moreover, Yellowdig's point system was designed around the idea that small influences on every individual student's behavior compound for the collective; each student posting even just one extra or very high-quality post per week is then multiplied across 50 or 100 students in a class. Importantly, the impact of these small changes in collective behavior often creates a feedback loop wherein the behavior of individual community members is altered even more. As with the study of any community or culture, the behavior of individuals is almost impossible to divorce from the context in which they are behaving.

The most important Yellowdig behavior variables are defined below:

- Conversation Ratio
 - The Conversation Ratio is the number of Comments a student made per Pin that they posted. The higher the Conversation Ratio, the more a student engages with others' rather than just creating new content.
- The Proportion of Posting Average
 - This is the degree to which a student's number of posts is over or under the average number of posts per student for the community. This proportion tells us how active in terms of creating content (Pins and Comments) a student was relative to their peers in the same class. It is calculated from the following formula:

$$\blacksquare \frac{(\text{student's total \# of posts}) - (\text{average \# of posts per student in community})}{\text{average \# of posts per student in community}}$$

- Point Differential
 - The point differential is the number of points the student earned minus the point goal set for the community. This number reflects the number of points the student scored above or below the point goal.
- The Proportion of Course Goal
 - The Proportion of Course Goal is the degree to which a student's total earned points is over or under the total point goal for the community. This number reflects the student's level of effort relative to the total points expected by the professor. Unlike the point differential, which is expressed in raw points, this accounts for the point expectation for the community. If a student has exceeded the point goal by 100 points in a class requiring only 100 points, they have exceeded the goal (as a proportion) by much more than if they are in a class requiring 1000 points. This proportion is calculated as follows:

$$\blacksquare \frac{(student's\ total\ \#\ of\ points) - (point\ goal\ of\ community)}{point\ goal\ of\ community}$$

Sampling Details & Sample Descriptive Statistics

The first Yellowdig communities were established at ASU Online in August of 2015. ASU Online has 175 fully online degree programs benefiting 30,000+ undergraduate and graduate students across the world with diverse backgrounds and at various places in their lives and careers.

The initial data output for this report was exported on December 5, 2018, and was inclusive of all Yellowdig activity in ASU Online courses. The full dataset encompassed 46,779 seats in 778 unique communities (average seats per community = 60.1). Of those seats, 20,737 were matched with student grades (A-E or Withdrawn; [ASU Grading Policy](#)). 17 additional seats were matched with unusual grade types that do not cleanly fit their scaled, A-E scheme (e.g., EN = Failing Never Participated; I = incomplete) and were excluded from most of our analyses. The “seats” in the classes and Yellowdig communities come from the sum of the enrolled users in each community who signed in and created at least one post. In actuality, this is different from the number of unique enrolled *students*, since individual students could be enrolled in multiple courses. However, for ease of reading, we will refer to these “seats” as students throughout the results of this report.

The process of matching students to their specific grades in a specific class was accomplished by taking the student email addresses from LTI launches into Yellowdig communities, using them to identify individual students, and combining that information with the community titles to link them to the appropriate classes. To associate a student grade with a Yellowdig seat, both pieces of information were required to exactly match. 440 of the 778 communities (representing 24,168 seats) had no matched students at all, so community and course title matches were the most common problem in identifying grades for the unique seats in the Yellowdig dataset. Around March of 2017, ASU started programmatically using more prescribed course titles for Yellowdig. Prior to that change, there are no community and course title matches, which explains almost one-third of the Yellowdig seats that did not match ASU grades ($N = 7,998$). An additional 16,178 seats were in communities with titles that did not

match a course title. See Table 1 for a breakdown of students by grade for the analyzed sample.

For 120 communities, all students in the community matched to grades for the course (4,991 seats). For the remaining 217 communities representing 17,612 seats, 15,763 seats with data in Yellowdig were matched to grades and 1,849 seats did not match to a specific student in the class with a grade (about 10.5%). Some of the seats without matching grades are likely undergraduate or graduate teaching assistants. They would likely appear active in the communities but not be assigned a student role in ASU's learning management system. For most of the classes where there was a mix of matching and non-matching seats, there were only 1 or 2 students that did not match to grades, which is consistent with teaching assistants filling those seats.

Table 1. *Breakdown of Students with Yellowdig Behavior Data and Matching ASU Grades By Number and Percent*

Grade	Grade Code	N	% of overall sample	% of matched sample
Not Matched	n/a	26025	55.6	n/a
A+	11	3632	7.8	17.5
A	10	5000	10.7	24.1
A-	9	2563	5.5	12.3
B+	8	1621	3.5	7.8
B	7	2418	5.2	11.7
B-	6	1139	2.4	5.5
C+	5	732	1.6	3.5
C	4	1385	3.0	6.7
D	3	519	1.1	2.5
E	2	991	2.1	4.8
Withdrew	1	737	1.6	3.6
EN	n/a	1	0.0	0.0
I	n/a	16	0.0	0.1
Total		46779	100.0	

Are students with matched grades a representative sample of Yellowdig users?

The differences between student behaviors in Yellowdig for those that matched to grades and those that did not were either not statistically significant or, given the large sample size, statistically significant but of little practical importance. For example, as seen in Table 2, which looks only at classes that had a mix of students that did and did not match, the means and standard deviations for the groups were similar in magnitude even though the differences were statistically significant ($p < .05$). Indeed the most meaningful difference for the majority of the non-matched sample is just that they participated in communities that were older since the structural changes to community naming conventions that allowed for the matches were not instituted until March 2017. For the purposes of this report, we found no evidence that the sample of students with matched grades was different from the unmatched students in a way that would systematically bias the results of this report or that indicate that the matched students do not constitute a randomly selected representative sample of the larger ASU Online student body.

Table 2. Breakdown of Yellowdig Seats with ASU Grades By Number and Percent

Variable	Grade?	N	Mean	SD	<i>p</i> -value of <i>t</i> -test
Conversation Ratio	Matched	14767	2.31	3.39	.044
	Not Matched	1679	2.49	4.38	
Total Posts (Pins & Comments)	Matched	15763	14.88	10.64	.010
	Not Matched	1849	14.21	11.25	
Proportion of Posting Average	Matched	15763	-0.02	0.43	.535
	Not Matched	1849	-0.03	0.74	
Total Number of Words Posted	Matched	15763	2046.51	1669.45	.767
	Not Matched	1849	2058.71	1755.57	
Total Pins Created	Matched	15266	5.30	3.62	.836
	Not Matched	1827	5.32	4.32	
Total Comments Created	Matched	15763	9.75	9.44	.001
	Not Matched	1849	8.95	10.66	

Results

Descriptive Statistics

This section presents overall descriptives statistics for various outcomes throughout this report (see also Table 3). The median student posted 13 times using 1,652 total words within their Community. As can be seen from the Point Differential and Proportion of Course Goal variables, the median student received 100% of the course points set as the goal for each

course, an indicator that most students do participate to the full extent required and that nearly 50% of the sample participated beyond the course requirement. The top 25% of point earners got *at least* 15% more points than the requirement set for their course goal.

1) Is greater participation in Yellowdig communities associated with better grade outcomes and improved course retention?

For the 20,737 students with grades matched to Yellowdig behaviors, zero-order Pearson correlations were positive between Yellowdig activity and student grades ($r = .240$ with Total Posts, $r = .416$ with Proportion of Posting Average, and $r = .278$ with Total Number of Words Posted) and between points earned and student grades ($r = .284$ with Total Points Accumulated, $r = .390$ with Point Differential, and $r = .227$ with Proportion of Course Goal). Figure 1 shows Total Posts by Grade. Figure 2 shows the Total Words Posted by Grade. Figure 3 shows the Proportion of Posting Average by Grade. These plots demonstrate the observed correlations for these variables and the clear drop off in course grades for the least active students.

Table 3. Yellowdig Behaviors by Student

	Convers- ation Ratio	Total Posts	Prop. of Posting Avg.	Total Words Posted	Points Earned	Point Differential	Prop. of Course Goal
Mean	2.29	14.40	-0.02	1983.57	86.71	-2.24	1.03
Std. Dev.	3.35	10.52	0.45	1608.85	58.29	43.33	0.86
Range	85.00	193.00	7.38	41461.00	760.00	950.00	19.50
Minimum	0.00	0.00	-1.00	0.00	0.00	-270.00	0.00
25th %ile	1.00	7.00	-0.22	1032.00	40.00	-15.00	0.80
Median	1.60	13.00	0.00	1652.00	86.00	0.00	1.00
75th %ile	2.33	18.00	0.15	2544.00	120.00	12.00	1.15
Maximum	85.00	193.00	6.38	41461.00	760.00	680.00	19.50

All $N_s = 20,754$ except Conversation Ratio ($N = 19,372$) which was undefined for students without Pins ($N = 1,382$)

The pattern of correlations between Yellowdig variables and whether students actually withdraw from the course are similar to those for grades but tend to be a bit smaller. For example, the Proportion of Posting Average is correlated .416 with grades and .273 with just withdrawals. This is somewhat expected because whether a student withdrawal is binary and it happens relatively rarely. However, it does illustrate that disengagement from Yellowdig communities predicts student dropouts.

Figure 1. Average Number of Posts Per Student

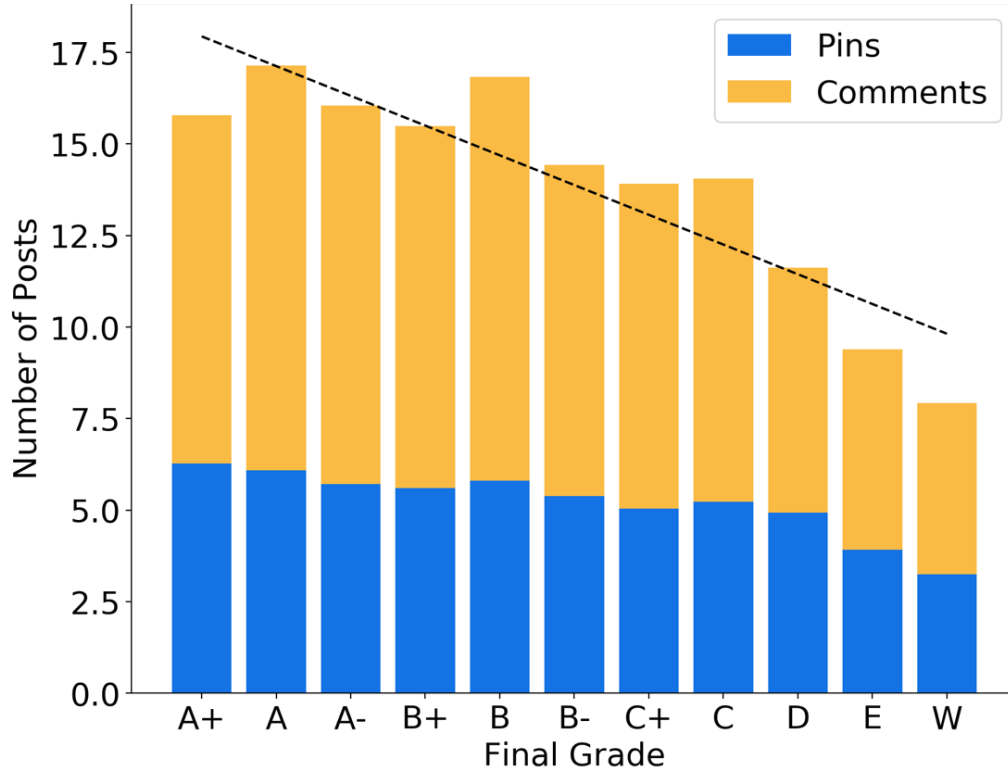
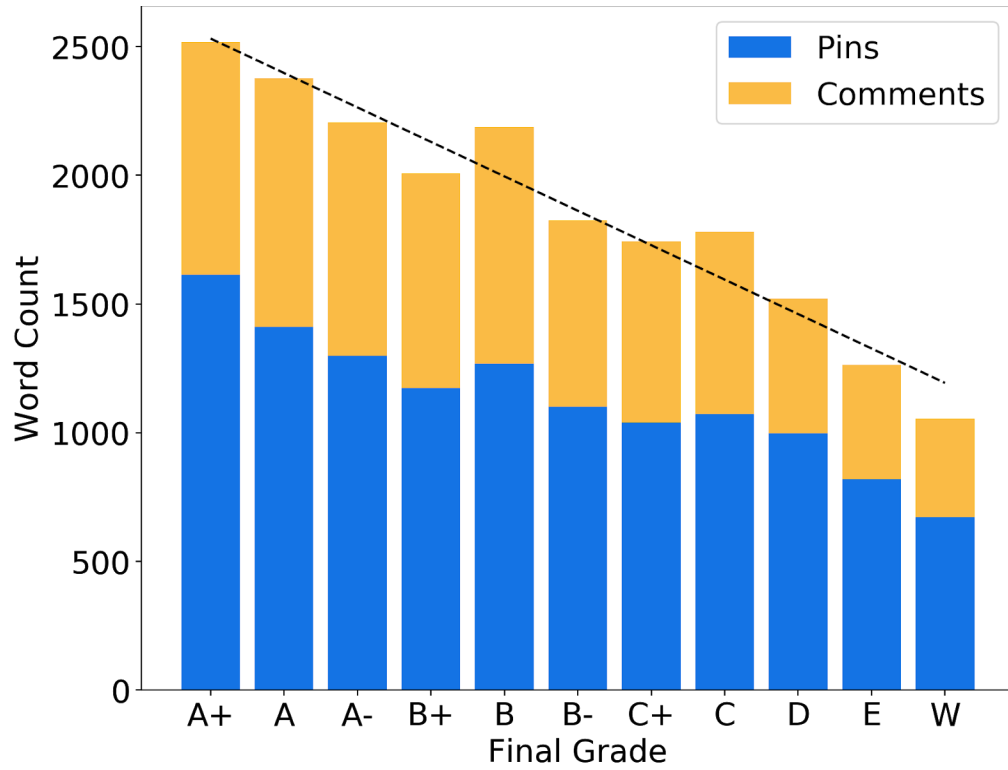
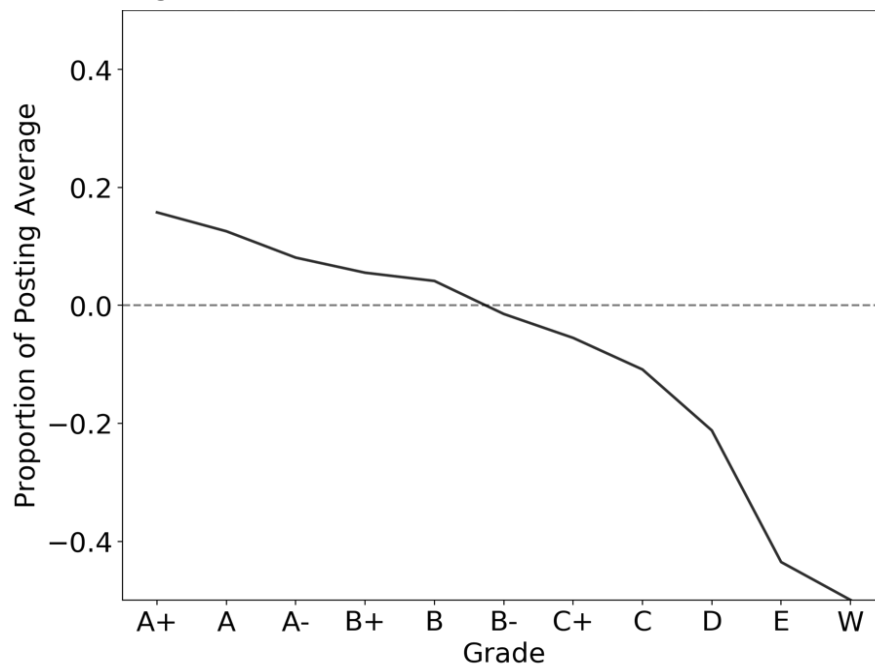


Figure 2. Average Total Word Count Per Student



Given the size of this database, the massive variability with which Yellowdig is implemented across these courses, and inherent variability in instructors' grading philosophy and criteria, some of these correlations are quite large. As suggested earlier, the expectations set up for assignments and the point parameters of a community have a large influence on student behavior within communities. The variables that account for the "average" behavior of a community or the professor's expectations as expressed through the community's settings tend to have higher correlations because they account for more of the variability in the context in which a student is posting. In other words, the "average" community variables control for individual instructors' expectations and instructions. Instructors' expectations, which influence how active the community is overall and what sorts of activities students engage in, can contribute unexplained variance (i.e., error) to measures of activity for individual students. Accounting for this error is likely why the correlation between course grade and Proportion of Posting Average is the highest (.416) among the zero-order correlations with no statistical controls. The class average is a proxy for the overall activity and expectations for that class and community; hence, the Proportion of Posting Average has a de facto control for different instructors' expectations and practices. As can be seen in Figure 3, students who are posting more than the class average tend to get grades of B or above with those who disengage from Yellowdig being the students who also tend to perform poorly or withdraw from a course.

Figure 3. *Proportion of Posting Average by Grade*



Due to the influence of the community settings and instructor expectations, a reasonable control variable for the influence of the course setup and the "health" of the Yellowdig environment is the community average number of posts per student. When that variable is entered as a control variable into the calculation of partial correlations, the correlation between a student's behavior in Yellowdig and their resulting class grade is closer to .40 for all of the

activity variables ($pr = .394$ with Total Posts; $.416$ with Proportion of Posting Average; $.329$ with Total Number of Words Posted).

As will be seen in later sections of the report, using Yellowdig's best practices impacts the outcomes generated, and these impacts are evident in the correlations. For communities using at least 5 out of 6 of Yellowdig's best practices, the relations between student activity or point earning and student grades were very strong. Partial correlations between course grades and Yellowdig activity, controlling for the average number of posts in a community, ranged from $.49$ to $.67$ ($pr = .602$ with Total Posts, $pr = .614$ with Proportion of Posting Average, $pr = .490$ with Total Number of Words Posted, $pr = .620$ with Total Points Accumulated, $pr = .670$ with Point Differential, and $.643$ with Proportion of Course Goal; $dfs = 287$; all $ps < .001$).

2) Are there specific ways of interacting in Yellowdig communities that improve grades or retention?

Across Yellowdig clients, a consistent predictor of a community's general success in garnering engagement (e.g., more posts or more students meeting and exceeding the point goal) is the community's Conversation Ratio (i.e., the number of Comments on the community divided by number of Pins). Based on student satisfaction metrics and client feedback, this ratio appears to be strongly connected to engagement because a high comment-to-pin ratio is indicative of students having actual conversations that are interesting, engaging, and fun. In other words, communities with high Conversation Ratios are promoting a learning environment that is quite different from a standard discussion board experience. An interesting property of this ratio is that it is computed with relative independence from the total number of posts and other actions. That is, both active and less active communities could have high or low Conversation Ratios. The amount of activity would not be expected to increase with this ratio unless the experiences within the communities were markedly different and more conversation was driving more engagement.

Based on these observations from other datasets, we expected that individual *students* with low conversation ratios would be more likely to perform poorly or withdraw from a course. This could be either because they are participating in less successful Yellowdig communities with overall lower conversation ratios, or because, in spite of having good opportunities to converse with other students, the individual student is choosing to post new content rather than engage with other students. The correlation between individual student conversation ratios and grade was $.044$, which was statistically significant ($p < .001$) but small in magnitude. The correlation between community conversation ratio and student grades was not significant ($r = -.012$; $p = .086$). However, a student's personal conversation ratio was correlated $.439$ with the total number of posts they created, $.333$ with the Proportion of Posting Average, and $.116$ with total words posted. Therefore, while a high Conversation Ratio may not necessarily lead to better grades for individual students, more conversation is related to higher engagement for individual students and for the course communities on the whole.

Though most Yellowdig activities were correlated with grade there was not strong evidence that any specific behaviors like giving or receiving upvotes, creating more Pins, or creating more Comments were *particularly* strongly correlated with grade. Overall it appears that students with higher grades tended to do and be the recipient of more of most of the

possible activities. Density plots of student posting by grade (Figure 4) do seem to indicate that most of the “extra” activity better performing students tend to do is commenting rather than pinning, with density spreading well into the upper left quadrant, representing students with more than 10 Comments but less than 10 Pins.

3) Are there community settings or properties that propel student achievement and can inform our best practices and recommendations for future implementations?

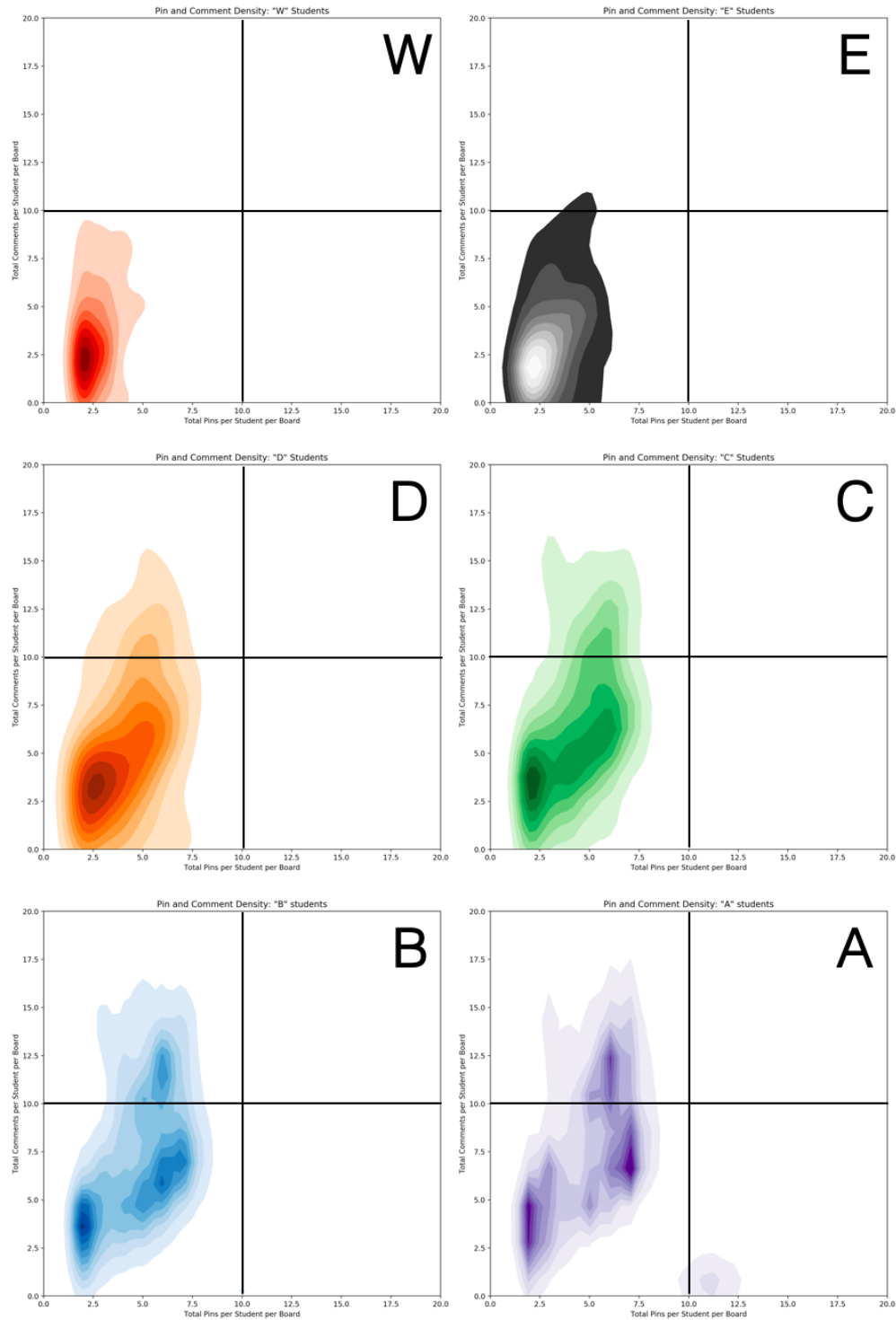
Whether communities are following certain of our best practices cannot be determined based on the data we collect. For example, Yellowdig was designed around *not* having strict weekly assignment prompts to which students are required to respond. That principle was based on the idea that students would have more natural and engaged conversations if they were invited to share and talk about things that they have encountered in their own lives, topics that they are struggling with understanding, or aspects of the course that they are finding particularly intriguing. It is impossible to know from the collected data whether instructors are following this practice. However, there are a number of best practices where compliance can be noted from community settings. To better understand how these best practices influence the success of communities and the students within them, we explored how some of these practices influence student behavior and outcomes.

The six best practices that are captured in the dataset are: 1) To have points and automatic grade passback to the learning management system enabled; 2) to have a weekly point maximum configured; 3) to have automatic “nudge” notifications enabled that alert students via email when they remain inactive for too long; 4) to make Comments worth more points per word than original Pins; 5) to award points when students receive Upvotes; and 6) to award points when students get a Comment on a Pin they created. Though Yellowdig’s recommendations are somewhat more nuanced with regard to allocating points and configuring each setting, each community was simply judged in binary fashion based on whether or not they followed the basic recommendation. Each community was given a score based on how many of the practices they followed. As seen in Figure 5, there is a wide distribution of best practices used and the majority of students are enrolled in courses using 2 or 3 of them.

The 6 best practices have been established from prior data because they tend to maximize engagement and get an appropriately high Conversation Ratio, which Yellowdig recommends to be a minimum of 3 comments-per-pin. As illustrated by Figure 6, one simple change to the point system or notifications can influence individual student behavior. In Figure 6 one can easily see that communities with Upvotes enabled have more students that produce higher Conversation Ratios. When used in aggregate, these simple and seemingly small manipulations of individual student behaviors have significant effects on overall community behavior, engagement, and student and instructor satisfaction with the experience.

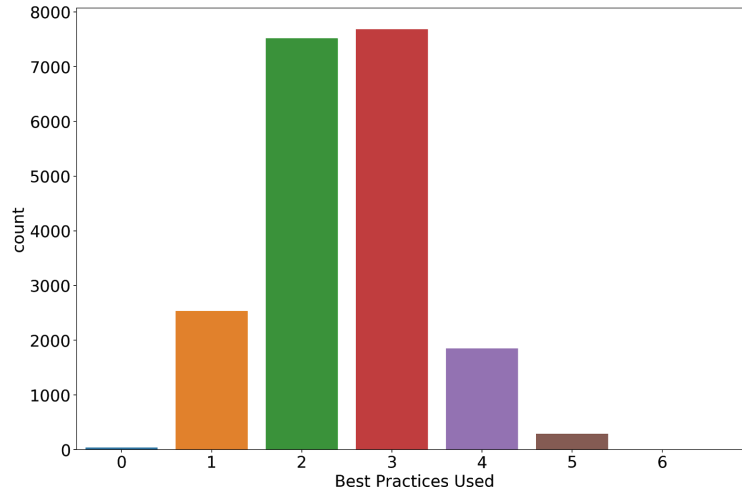
In Figure 6 there are two large spikes at conversation ratios of 1 and 2 for communities with Upvotes disabled. The most obvious explanation for these spikes is that the instructors who tend to turn off social points are also prescribing a response pattern in surfacing Yellowdig to students (“Each week Post once and comment on [1 or 2] other posts”) and are probably requiring students to respond to weekly prompts that they have designed. Such assignments are common fodder in traditional discussion forums. When we see these assignments

Figure 4. Pin (x-axis) and Comment (y-axis) Density Plots by Grade with Higher Grades at the Bottom



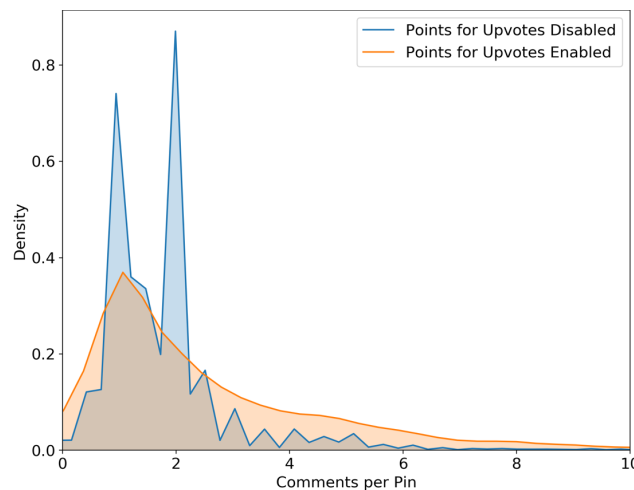
Note: Comment counts are on the y-axis and Pin counts are on the x-axis, with both axes varying from 0-20. The grid lines that cross at the center represent 10 Pins and 10 Comments.

Figure 5. Total Students in communities by Number of Best Practices Used



combined with social point categories being turned off, it is often the case that points are being used to grade posts and penalize those who do not comply with *instructor* expectations. The intended purpose of the gamification point system in Yellowdig is to alter behavior, not assess it, and to get students interacting with their *peers*. Yellowdig is designed to inspire quality posting and pro-social interactions that lead to healthy learning communities by rewarding those behaviors. These decisions about how to implement Yellowdig seem to fundamentally alter how students conceive of their role and responsibility in sustaining conversations and engaging with other students. More importantly, these data and a litany of other examples show that these implementation decisions also affect students' intrinsic motivation to participate beyond the minimum prescribed requirements.

Figure 6. Conversation Ratio Density Function Plot for Communities with Points for Upvotes Disabled vs. Enabled



Note: The y-axis in the above plot corresponds to the probability density function (PDF or 'density') for communities with points disabled and enabled. This plot visualizes a function whose value at any given point in the sample space can be interpreted as providing a relative likelihood that a randomly sampled value of the variable would equal that point.

As seen in Figure 7, the suggested best practices for Yellowdig do indeed yield higher conversation ratios (i.e., comments-per-pin) for all grade levels. More importantly, best practices also yield communities where more students participate voluntarily, beyond the course goal (Figure 8), indicating that students are seeing more intrinsic value in participating in these communities. As already mentioned, Yellowdig activity in these communities is also more strongly related to grade.

Figure 7. Conversation Ratio Versus Number of Best Practices Used

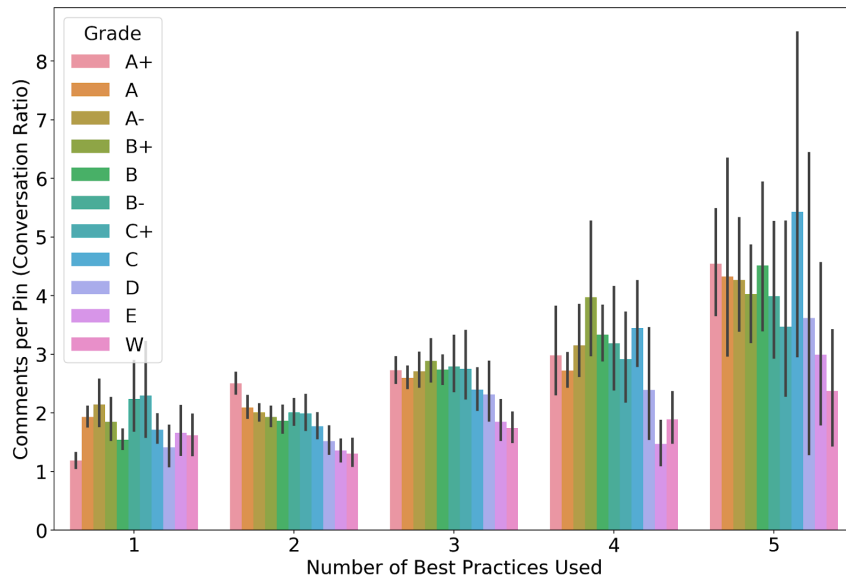
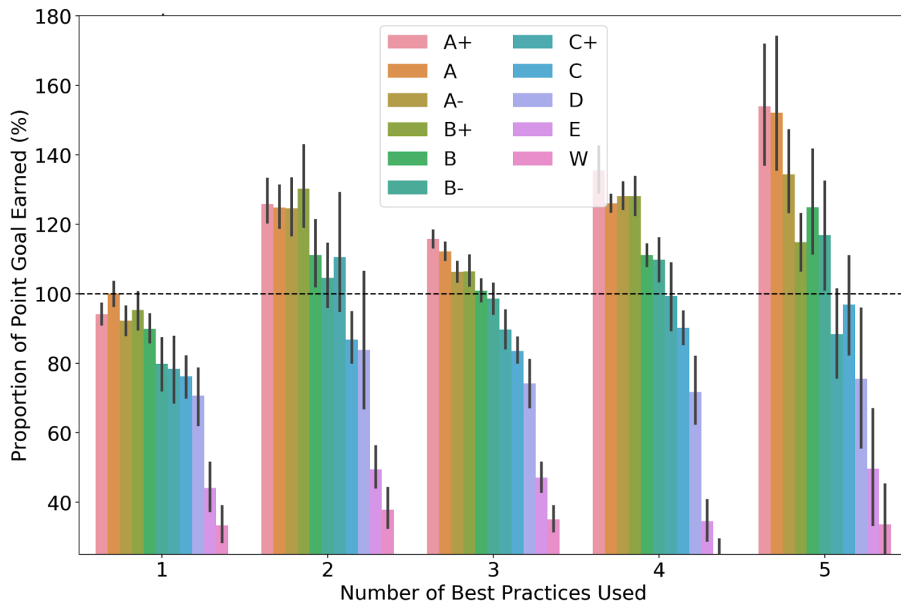


Figure 8. Proportion of Point Goal Versus Number of Best Practices Used



Discussion

This research aimed to explore three research questions: 1) Is greater participation in Yellowdig communities associated with better grade outcomes and improved course retention?; 2) Are there specific ways of interacting in Yellowdig communities that improve grades or retention?; 3) Are there community settings or properties that propel student achievement and can inform our best practices and recommendations for future implementations?

We did indeed find clear positive correlations between Yellowdig participation and course grade outcomes ranging between about 0.2 and 0.4. These relations were much larger when the overall amount of activity within the student's community was accounted for and was larger in communities using more of Yellowdig's best practices. A number of these correlations predicted upward of 30% of the variability in grades from Yellowdig activity (i.e., $r_s > .6$).

There were fewer clear answers to the second question. The data indicate that producing more Comments than Pins is related to more engagement, but the correlation between a student's conversation ratio and their grade is modest. Nonetheless, it appears that, as grades increase and students post more, they comment more often than they pin. (See Figure 4.)

For question three, certain community settings definitely propel student activity in Yellowdig. Communities that use these settings and avoid restrictive assignments tend to inspire more students to engage in Yellowdig well beyond the point requirements. There are some indications that this additional activity has direct educational benefits for learning class material and, at least, it appears very likely to be increasing the average student's contact time with course-relevant material. There are not many instances in which students voluntarily participate in course-related work well beyond what is required of them. Though speculative, many of the students seem to be getting a certain amount of intrinsic value from participating, especially in healthy communities. Even if this activity is not causally related to course performance (which is always possible in a correlational study), it is almost certainly related to one or more other positive outcomes such as an increase in student curiosity, satisfaction with the course, student-instructor interactions, or making social connections and networking with other students. These non-academic outcomes would all confer other kinds of benefits to learners and to the institution.

The unifying story of these data is that conversations happen when students comment back-and-forth. Those conversations are strongly tied to how engaging a community is and appear, given correlations between participation and grades, to provide more learning opportunities for students who participate. The possible causal explanation for why participating in Yellowdig and especially engaging in conversations is important for learning is because back-and-forth conversations can only happen when students are actually reading and thinking about the things being posted in the community.

Limitations and Future Directions

An obvious strength of this report is the sheer number of students represented. Given the size of this database and the massive variability with which Yellowdig is implemented across these courses, some of the observed correlations are quite large. As suggested earlier, the

expectations set up for assignments and the point parameters of a community have a large influence on student behavior within communities. For example, of the 20,737 seats in the sample, there were 1,382 seats in Yellowdig communities where the student did not log a single Pin and the Conversation Ratio was undefined. On inspection, the vast majority of these students were in communities with other students that did not have many (or any) Pins but did have many Comments. The logical conclusion is that the vast majority of these students had been told by the instructor to *only* add Comments to Pins that the instructor was posting. Many of these communities still had the point system turned on and points allocated to Pins. Whether these communities were still “successful” in achieving what these professors expected cannot be inferred from this dataset. Nonetheless, cases like these suggest that course setups, which are often unknown from the Yellowdig dataset alone, are contributing significant noise (i.e., error) into predictions between posting behavior and various student outcomes.

The uncertainty related to pedagogy and implementation is likely the reason that variables accounting for the “average” behavior of a community tend to have higher correlations. The context in which a student is active contributes unexplained variance (i.e., error) to the correlations across communities; when this error is accounted for, the correlations between Yellowdig use and grades are quite large (around .4). The ability to systematically investigate these influences is a weakness of correlational designs, and future work could explore similar questions with other designs.

Likewise, while this dataset is large and representative of diverse populations, it provides relatively little insight into class-level implementation strategies and pedagogical practices. In spite of our attempts to investigate some of the individual community settings and student behaviors that spur positive outcomes, future work with this dataset and others like it could bolster these high-level outcomes with careful, controlled, and randomized studies of classroom implementation and instructor behavior within the platform.

In spite of these weaknesses, the data do clearly indicate strong relations between participation and engagement in Yellowdig and grade outcomes, which warrant adoption and continued experimentation with implementation and point rewarding strategies.

About the Authors:



Philippos Savvides - EdPlus at ASU - Learning Technology Manager

Philippos received his Ph.D. in Educational Technology from Arizona State University. He now leads the learning technologies team at ASU Online where he uses technology to create online learning experiences for a diverse and distributed student population. He regularly works with emerging technologies and technology startups, where he helps validate and improve products for the higher education market. He has over 7 years of experience as an instructor and instructional designer and continues to teach a course on Enterprise Strategy and Innovation.



Serah Ye - ASU Enterprise Partners - Director of Analytics & Insights

Serah holds two Master's degrees, one in Marketing from the University of Arizona and a second in Library and Information Science from Wayne State University. She also has over 16 years of professional experience in research and analytics which she applies as the Director of Analytics and Insights at ASU Enterprise Partners.



Brian Verdine, Ph.D. - Yellowdig - Head of Customer Success

Brian received his Ph.D. in Psychology from Vanderbilt University's Peabody College of Education and Human Development. He went on to a postdoctoral position in the Education department at the University of Delaware where he later became, and continues to be, an Affiliated Assistant Professor. His academic research and his now primary career in educational technology has focused on understanding and improving learning outside of classrooms, in less formal learning situations. At Yellowdig he manages all aspects of Customer Success with a strong focus on how implementation in classes influences instructor and student outcomes.



Samuel Kampa, Ph.D. - Yellowdig - Customer Success Specialist

Samuel received his Ph.D. in Philosophy from Fordham University. He taught seven classes and nearly 200 undergraduate students at Fordham. He brings to Yellowdig that teaching experience, an enduring interest in improving pedagogy, and data science training that has helped expand Yellowdig's data analysis capabilities and improve instructor training materials.