

THE STICKER STUDY:
AN EXAMINATION OF THE EFFECT OF SMALL TANGIBLE REWARDS ON INTRINSIC
MOTIVATION AND PERCEPTIONS OF PERFORMANCE MASTERY FOR STUDENTS

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ABSTRACT

The efficacy of stickers as a motivational tool is an oft-overlooked topic in the field of research concerning extrinsic and intrinsic motivation. This study examines whether small tangible rewards (in the form of stickers) strengthen the intrinsic motivation of students in grades 6-8 to complete an online computer science course.

Students were taught computer science lessons over a period of two months and given the chance to voluntarily complete online lessons at Code.org. The research study was composed of an experimental group who received stickers and a control group who received nothing for their performance mastery of online lessons. Students also completed a computer science survey at the beginning and end of the research trial, which measured perceptions and attitudes toward computers, coding, learning, motivation, grades, and stickers.

A significant relationship was found to exist concerning the perceived knowledge of how to code for both the control and experimental group. The control group, who did not receive stickers, showed a significant positive correlation with the intrinsic value that learning is its own reward that the experimental group did not. However, there was no significant difference in performance mastery of online lessons between the groups for the research study trial. The divergence in attitudes toward learning being its own reward is attributed to stickers giving students in the experimental group an inflated and inaccurate self-conception of achievement.

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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

“There is only one corner of the universe you can be certain of improving, and that’s your own self.”

– Aldous Huxley, English Novelist

“Everything will be okay. I have a sticker on my laptop that says that.”

– Sharon Van Etten, American Musician

Great teachers motivate and guide students to successful outcomes. This axiomatic truth is evident as far back as Socrates probing Plato over 2400 years ago. The best teachers motivate students to search for truth and uncover wisdom, while avoiding potential pitfalls, diversions, and hemlock. The questions for teachers to ask then is how to drive student performance to its maximum potential? What motivates and accelerates student learning and achievement? What can teachers do to kindle the flame of interest to set students on a path to enlightenment?

The “go to” answer for many teachers to engage and incentivize students is the sticker. This humble piece of paper is an indispensable tool in the modern teaching arsenal. It has a hallowed place in the pantheon of pedagogical importance, and teachers invest an extreme amount of hope and faith that a bit of sticky residue will be a panacea to all educational ailments. Given the almost universal acceptance and adoption of stickers by modern teachers, the efficacy of stickers to motivate students to successful academic outcomes merits further investigation.

Purpose of the Study

This study will explore the relationship between stickers and the intrinsic motivation of students in order to determine if a correlation exists that would justify a major experimental study of sticker efficacy. The research collected will also inform policy decisions at Guardian Angels School regarding whether or not to allow stickers on school laptops.

Problem

Do small tangible rewards (stickers) strengthen the intrinsic motivation of students in grades 6-8 to complete an online computer science course?

The hypotheses of this study is that small tangible rewards (stickers) will strengthen the intrinsic motivation of students in grades 6-8 to complete an online computer science course.

The null hypothesis of this study is that small tangible rewards (stickers) will not strengthen the intrinsic motivation of students in grades 6-8 to complete an online computer science course.

Significance of the Study

This study is significant in the following ways:

- 1) Teachers are searching for economical and effective ways to lead students to successful academic outcomes. This study will investigate questions regarding the effectiveness of a dominant classroom practice.
- 2) Student participation in the online computer science course is voluntary and not graded. This study isolates stickers as the only variable to determine if a correlation exists between stickers and the intrinsic motivation of students.

Assumptions of the Study

This study assumes the following:

- 1) Students responded honestly to survey questions.
- 2) The survey is a valid measure of the items it sets out to explore.
- 3) Stickers were isolated as the only variable between the control and experimental groups.

Limitations of the Study

The following items limit the study:

- 1) This study is limited to a private Catholic school with little racial or socio-economic diversity. The school is primarily white and upper middle class.
- 2) This study is limited to students in grades 6-8.
- 3) Students with special needs were excluded from this study.
- 4) Students who are talented and gifted were excluded from this study because of their participation in an advanced alternative curriculum during all classroom instructional activities for this study.
- 5) The 8th grade participants did not comprise a large enough group to have confidence that their data are representative of the overall 8th grade group.
- 6) The 8th grade participants had many distractions, including a Washington, D.C. field trip and looming graduation.

Definitions

- cognitive evaluation theory (CET): predicts rewards contribute to intrinsic motivation if viewed as indicators of competence as opposed to controllers of behavior
- learned helplessness theory (LHT): predicts when people receive rewards not contingent upon the quality of their performance, they become helpless, but when rewards are given based upon the quality of their performance, they become industrious
- massive open online courses (MOOCs): courses available online that are free, self-paced, and usually designed to address a curricular deficit corporations need to fill
- self-perception theory (SPT): predicts postbehavioral attributions formed in consideration of the condition in which the behavior occurred will affect intrinsic motivation

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

Intrinsic motivation is often studied in educational research, but the efficacy of stickers as a motivational tool is surprisingly overlooked as a research topic considering millions of dollars are spent every year on stickers (Strauss, 2016). The articles that do specifically discuss stickers often do so in a glib or offhanded way without much scientific inquiry. If there is a cost-benefit analysis, the analysis usually explores cost in detail without giving much thought to benefit. This is especially true in the analysis of “I Voted” stickers for elections in the United States where it is seen county governments have reduced costs up to \$90,000 or more by not offering these stickers anymore, but little or no evaluation is done to discover what benefits (civic pride, voter turnout, etc.) may be lost (Waxman, 2016). This study spent \$12 on stickers in an effort to discover if stickers have a significant relationship with the intrinsic motivation of students in grades 6-8 to complete an online computer science course in the hope of finding an answer of some benefit.

Taking into account a lack of specific research concerning stickers, this literature review will examine a broader view of research regarding the effects of extrinsic rewards on intrinsic motivation. In 1999, a meta-analysis of 128 studies identified three general categories worthy of close investigation: motivational theory, attributional theory, and behavioral or cognitive behavioral theory (Deci, Koestner, & Ryan, p. 628). These categories will serve as a framework

to review established theory before moving on to explore relevant literature, perception of goals, and massive open online courses (MOOCs).

Motivational Theory

An important framework for motivational theory is the cognitive evaluation theory (CET), which proposes:

...rewards can be interpreted by recipients primarily as controllers of their behavior or, alternatively, as indicators of their competence. In the former case, rewards are predicted to thwart satisfaction of the need for autonomy... and undermine intrinsic motivation. In the latter case, however, where rewards are positively *informational*, they are predicted to provide satisfaction of the need for competence and thus to enhance intrinsic motivation.

(Deci et al., 1999, p. 628)

The goal then, according to CET, is to *encourage rewards that are indicators of competence* and avoid rewards perceived as controllers of behavior to enhance intrinsic motivation.

Attributional Theory

The best known framework for attributional theory is built upon self-perception theory (SPT), which suggests an overjustification effect:

People are said to make postbehavioral attributions about the causes of their own behavior based on a consideration of the behavior and the conditions within which it occurred. When people are rewarded for doing an interesting activity, they are likely to attribute their behavior to the reward and thus discount their interest in the activity as the

cause of their behavior, leading to postbehavior intrinsic motivation that is lower than it would be if they had not gotten the reward. (Deci et al., 1999, p. 630)

The implication of SPT is that rewards given for mere participation in interesting activities will cause harm to intrinsic motivation. However, SPT is still in alignment with CET with respect to “when rewards convey positive competence information, they are less likely to undermine intrinsic motivation” (Deci et al., 1999, p. 630).

Behavioral or Cognitive Behavioral Theory

There is disagreement among behaviorists as to whether intrinsic motivation is too obscure a concept and therefore not useful (Deci, et al., 1999, p. 630). However, work built upon the learned helplessness theory (LHT) was perceived to merit further investigation by the Deci et al. meta-analysis and predicts:

...when people receive rewards that are not dependent on the quality of their performance (e.g., engagement-contingent and task-noncontingent rewards), they learn that they cannot control the receipt of rewards, so they become helpless. ...when rewards are dependent on the quality of performance (i.e., performance-contingent, completion-contingent, and verbal rewards), the rewards facilitate learned industriousness, which means that effortful activity takes on secondary reward properties, an effect that many have interpreted as increased intrinsic motivation. (Deci, et al., 1999, p. 630)

The practical lesson then of LHT is similar to CET and SPT in that the quality of performance, which is an *indicator of competence*, is what should be rewarded in order to increase intrinsic motivation. On the other hand, the practice of giving away “participation trophies” (engagement-contingent rewards) is thought to develop learned helplessness and decrease intrinsic motivation.

Deci et al. Meta-Analysis Results

The 1999, Deci et al., meta-analysis found “tangible rewards had a significant negative effect on intrinsic motivation for interesting tasks, and this effect showed up with participants ranging from preschool to college” (p. 653). This result was primarily tied to rewards being perceived as controllers of behavior instead of indicators of competence. Interestingly enough, verbal rewards (positive feedback) were found to have a significant positive effect on intrinsic motivation because *verbal rewards were perceived to affirm competence*. Data from the meta-analysis show strong support for CET predictions made by the theory (p. 654). Review of studies focused on the attributional approach found “rewarded subjects attribute their task performance less to internal causes” (p.654). Additional studies are needed to verify these results, but SPT predictions align with this observation. As to LHT, the meta-analysis found there is little evidence that helplessness follows receipt of uncontrollable positive outcomes, so “predicting that engagement-contingent or task-noncontingent rewards induce helplessness does not have an established empirical basis” (p. 654). Overall, the findings of this meta-analysis show:

...there are conditions under which tangible rewards do not necessarily undermine intrinsic motivation, but the evidence indicates clearly that strategies that focus primarily on the use of extrinsic rewards do, indeed, run a serious risk of diminishing rather than promoting intrinsic motivation. (Deci, et al., 1999, p. 659)

The important thing to note with regard to this meta-analysis is that it clearly shows that rewards that are not tied to *indicators of competence* are likely to have a negative rather than a positive effect on intrinsic motivation. It remains to be seen if stickers given in response to the mastery of lessons in an online computer science course will promote the intrinsic motivation of students in grades 6-8.

Literature Review

One of the earliest and most essential studies on intrinsic motivation discovered “...when money is used as an external reward for some activity, the subjects lose intrinsic motivation for the activity” (Deci, 1971, p. 114). However, “...when verbal reinforcement and positive feedback are used as the external rewards, the subjects’ intrinsic motivation seems to increase relative to the non-rewarded subjects” (Deci, 1971, p. 114). Money had the effect of moving the perceived locus of control for an activity away from an internal to an external control. This study made clear the danger of rewards to disincentivize a desired outcome as subjects who used to enjoy an activity ceased to have the same level of enjoyment after being paid for the work and then having the payment removed. The effect rewards can have on intrinsic motivation needs to be carefully considered before implementing any kind of rewards system.

Modern research into financial incentives in more than 250 urban schools in five cities by Allan and Fryer have found contrary results that show “incentive programs had little to no effect on intrinsic motivation” (2011, p. 17). In their research, \$9.4 million was distributed to roughly 36,000 students in randomized control trials for performance according to a simple incentive scheme (Allan & Fryer, 2011, p. 7). Of note, the experiments identified input incentives as being more effective than output incentives (Allan & Fryer, 2011, p. 15). These results oppose LHT predictions regarding engagement-contingent and task-noncontingent rewards being inferior to performance-contingent rewards. Allan and Fryer explain this behavior by postulating, “If students only have a vague idea of how to increase their test scores, then when provided with incentives for performance, they may not be motivated to increase effort” (2011, p. 15). Incentivizing inputs for specific behaviors in this study improved performance outcomes.

Experimental research into intrinsic motivation has historically rested on a behavioral measure called the “free choice” measure or “self-reports of interest and enjoyment of the activity per se” (Ryan & Deci, 2000, p. 57). Ryan and Deci explain the “free choice” measure in the following way:

In experiments using this measure participants are exposed to a task under varying conditions (e.g., getting a reward or not). Following this period, the experimenter tells participants they will not be asked to work with the target task any further, and they are then left alone in the experimental room with the target task as well as various distractor activities. They thus have a period of “free choice” about whether to return to the activity, and it is assumed that, if there is no extrinsic reason to do the task (e.g., no reward and no approval), then the more time they spend with the target task, the more intrinsically motivated they are for that task. (2000, p. 57)

Because of the length and complexity of the online computer science course used for this study, which can take up to 20 hours or more to complete, the “free choice” method of experimental measurement was not pursued in favor of surveying students to provide a self-report of interest. Although, the “free choice” measure may make for a compelling future study if researchers can account for the many different variables that such a long study may encounter (e.g., differences in pacing, attendance, environment, etc.).

The various outcomes from research on extrinsic rewards on intrinsic motivation show correlation between a previous inclination to perform a task and demonstrated effort. Pintrich and Groot found students who “believed that their school work was interesting and important were more cognitively engaged in trying to learn and comprehend the material” (1990, p. 37). Guryan, Kim, and Park published that “students who were the most motivated... responded most

strongly to the incentives” (2016, p. 18). In addition, “incentives may induce productive behavior among students who are motivated to read and learn, but not for students who do not already possess that self-motivation” (p. 19). In a note of warning, Guryan, et al. show, “rewards may not be a well-targeted strategy for increasing educational investments by less-motivated students” (p. 19). Ainley, Hidi, and Berndorff indicate a link between student interest in a topic and affective response (2002, p. 558). The unifying principle from these studies appears to be that incentives may work for already motivated students but may not work for students who fail to see the point or value of assignments.

Perception of Goals

Researchers looking for ways to motivate students often turn toward goals. Senko, Hulleman, and Harackiewicz identify two important categories for goals: “mastery goals, which focus on acquiring and developing competence, and performance goals, which focus instead on demonstrating one’s competence and outperforming others” (2011, p. 27). Both categories deal with acquiring or demonstrating *competence*, which is of crucial importance in the consideration of distributing rewards. Students in the sticker study working to obtain mastery of online course materials must acquire and develop competence in order to complete lessons, which is a clear mastery goal. However, for students in the experimental group who receive stickers to place upon their laptops for online lesson completion, this mastery goal may morph into a performance goal as it becomes clear from the number of stickers on a laptop how well students are doing in comparison to their peers. What used to be a mastery goal may become a performance goal if students desire to demonstrate their competence by outperforming others. Senko, et al., clarified the differences in perceived abilities between students based upon what goals they strive to

attain, and explained students who pursue mastery goals tend to view ability as something that can be improved through increased effort; whereas, students who pursue performance goals view ability as fixed (2011, p. 27). There seems to be a self-fulfilling prophecy at work then with performance goals, where the perceived ability of being good at something actually leads to good outcomes for those with that perception. Senko, et al., reviewed studies on this topic and documented that “performance goals are more robustly correlated with achievement than are mastery goals” (2011, p. 42). Although this result may seem discouraging for proponents of mastery goals and all those who seek to promote the improvement of abilities for every student, there is still value to be found:

Students who pursue mastery goals, compared to those who do not, often find their classes interesting, persist when facing difficulty, value cooperativeness, seek help when confused, self-regulate effectively, use deep learning strategies (i.e., elaborating the material, connecting it to other concepts), navigate decisional conflict well, experience positive emotion, and perceive tasks as valuable. (Senko, et al., 2011, p. 27)

In contrast, “...performance goals may interfere with collaborative learning and encourage openness to cheating” (Senko, et al., 2011, p. 43). Performance goals may lead to improvements in academic achievement, but it seems to be fundamentally at odds with the goal of education to instruct and improve the abilities of *all* children.

Massive Open Online Courses (MOOCs)

A system of winners and losers by definition will never be a system that is beneficial to all students. This may not have been a problem for most of American history as students were tracked into learner versus laborer career paths, but it will most certainly be a problem for

education moving forward where high levels of achievement will be necessary for all students.

Vollman aptly describes this systemic problem in the book *Schools Cannot Do It Alone*:

America's schools were not designed to teach all children to high levels. They were designed to select and sort young people into two groups: a small handful of thinkers and a great mass of doers according to the workplace needs of an agro-industrial society. (2010, p. 41).

Workplace needs are changing in the knowledge era, so MOOCs have been financed and created by corporations in an attempt to make up for important shortcomings in student development within modern schools. The computer science course students in this sticker study participated in is a type of MOOC, and companies like Amazon, Facebook, Google, Microsoft, and more have sponsored the content and its development (Partners, 2018).

An important distinction between a regular course enrollment and a MOOC is that students in a MOOC usually do not make a commitment to complete the course at enrollment (DeBoer, Ho, Stump, & Breslow, 2014, p. 81). Indeed, many students sample MOOCs or only work on aspects of the curriculum that interest them. There is no contract for completion, and as such, it can be difficult to determine course mastery for students who only partially complete the curriculum. DeBoer, et al., suggest students "set and pursue individualized goals that represent criteria for evaluating their course experience... rather than criteria set by instructors (2014, p. 82). There were no grades attached to work completed or not completed by students for this sticker study, so students had a level of autonomy that is typical of participation in MOOCs. Students were encouraged to work on the online course curriculum but never *required* to do so at any point during the study. It was left to the students to set their own goals for completion.

Impact of Study

There is a considerable amount of research available on the relationship between extrinsic rewards and intrinsic motivation. Researchers have developed theories to help frame an accurate understanding of this complex relationship, and significant results have been uncovered by their research. This paper will differ from existing research in that it will provide an examination of the effectiveness of stickers, an oft-overlooked topic, to act as a motivational tool to increase the intrinsic motivation of students in grades 6-8 to complete an online computer science course.

CHAPTER III

METHODOLOGY

Purpose of the Study

The purpose of the study is to explore the relationship between stickers and the intrinsic motivation of students to complete an online computer science course in order to determine if a correlation exists that would justify a major experimental study of sticker efficacy. The research collected will also inform policy decisions at Guardian Angels School regarding whether or not to allow stickers on school laptops.

Setting and Population

The setting for this research is a private, coed, Catholic school (grades K-8) located in Mount Washington, a suburban neighborhood of the City of Cincinnati, Ohio. The population is mostly white and upper middle class students as there is little racial or socio-economic diversity. Students with special needs and students who are talented and gifted were excluded from the study. There were 64 students in grades 6-8 that participated in the study: grade 6 had 16 total students (12 female, 4 male), grade 7 had 30 total students (16 female, 14 male), and grade 8 had 18 total students (10 female, 8 male).

Data Collection

Students voluntarily participated in the “Computer Science Fundamentals: Express Course” at Code.org over a time period of two months. No grades were given for participation and no time was allocated in class specifically to work at Code.org. The course had a mixture of

“unplugged” and computer-based (online) lessons. The author taught all of the 11 unplugged activities and encouraged all students to continue the study of computer science at Code.org where there were an additional 20 lessons available. In order to study the relationship between stickers and the intrinsic motivation of students, the author split students into control and experimental groups. Students in the experimental group that completed lessons at Code.org received stickers once a week for each of the lessons they successfully completed. Students in the control group did not receive any kind of reward.

In order to ensure an equal distribution of student abilities between the control and experimental groups, the author of the study used average grade data from the school’s database. The method employed to create an equal distribution was to rank all 64 students by their average grades from highest to lowest and then sort the students by gender and grade level. The students were then placed alternatively into the control and experimental groups. To remove any potential bias of the author to influence which students were placed in either the control or experimental groups, a coin flip determined which group would start the back and forth categorization. Sorting by gender and grade level was done to guarantee there would be an equal number of male and female students in the control and experimental groups for each grade. In effect, this process ranked all female students by their average grades from highest to lowest and ranked all male students by their average grades from highest to lowest in each respective grade and then placed them alternatively into the control and experimental groups.

The Survey

At the beginning and end of the study, all participants took a computer science survey designed to measure perceptions and attitudes toward computers, coding, learning, motivation, grades, and stickers. The survey had 8 statements on a 4-point Likert scale and one open-ended

question, “Do stickers help motivate you to succeed? Why or why not?” Table 1 details the contents of the 8 Likert statements:

	Strongly disagree	Disagree	Agree	Strongly agree
S1. I know how to use a computer				
S2. I know how to code				
S3. I believe learning is its own reward				
S4. I perform best under pressure from other people				
S5. I like to work at my own pace				
S6. I am self-motivated				
S7. Grades motivate me				
S8. Stickers motivate me				

Table 1. Survey Statements Measured by a 4-point Likert Scale

The study assumes the survey is a valid measure of all the items it sets out to explore and that students responded honestly to all survey questions.

Data Compilation and Analysis

Quantitative data were collected once a week over a two month period regarding student completion of lessons in the “Computer Science Fundamentals: Express Course” at Code.org. Each lesson was given a 5 point value, so that the overall possible top score with 20 lessons is a maximum of 100 points for any student. Quantitative data were also collected regarding perceptions and attitudes by the Likert survey statements administered at the beginning and end of the study. Differences between the control and experimental groups will be compiled and analyzed into charts and tables. In addition, open-ended responses to the survey will be imported into a spreadsheet in order to analyze qualitative data.

Summary

The goal of this study is to determine the effectiveness of stickers to increase the intrinsic motivation of students. The quantitative data supplied by the control and experimental groups voluntary participation at Code.org and the survey results will provide an empirical answer as to whether a correlation or significant relationship exists between stickers and intrinsic motivation. If there is a correlation between these items, Guardian Angels School may revise its policy concerning the outright ban of stickers on laptops to be more inclusive of stickers earned as rewards for student achievements.

CHAPTER IV

RESULTS

Introduction

The investigator surveyed students in grades 6-8 at the beginning and end of a two month period that featured 11 unplugged lessons taught by the investigator regarding principles of coding and computer science. 64 students participated in the research study with 32 students in a control group who received no external rewards and 32 students in an experimental group who received stickers for mastery of online content. The survey data and research study data will be examined in further detail below.

Presentation of Survey Data

Participation in the 11 unplugged lessons led to a significant ($p < 0.00001$) improvement in self-perceived knowledge of how to code for all students with an effect size of 5.44. This was measured by assigning the values in Table 2 to individual survey responses and doing a T-Test calculation between beginning and end survey results.

	Strongly disagree	Disagree	Agree	Strongly agree
Survey Response Values for T-Test Calculations	0	0.333	0.667	1

Table 2. Survey Response Values for Likert Scale used for T-Test Calculations

A total of 21 students moved from either “Strongly disagree” or “Disagree” up to “Agree” or “Strongly agree” for the second survey statement. The results are presented in Table 3.

	Strongly disagree	Disagree	Agree	Strongly agree
S1. I know how to use a computer	0 , 2 (+2)	2 , 0 (-2)	36 , 31 (-5)	26 , 31 (+5)
S2. I know how to code	7 , 0 (-7)	25 , 11 (-14)	27 , 45 (+18)	5 , 8 (+3)
S3. I believe learning is its own reward	2 , 0 (-2)	10 , 9 (-1)	42 , 39 (-3)	10 , 16 (+6)
S4. I perform best under pressure from other people	13 , 13 (0)	40 , 35 (-5)	8 , 13 (+5)	3 , 3 (0)
S5. I like to work at my own pace	0 , 1 (+1)	1 , 0 (-1)	30 , 28 (-2)	33 , 35 (+2)
S6. I am self-motivated	3 , 1 (-2)	8 , 10 (+2)	43 , 40 (-3)	10 , 13 (+3)
S7. Grades motivate me	1 , 1 (0)	6 , 7 (+1)	34 , 31 (-3)	23 , 25 (+2)
S8. Stickers motivate me	17 , 18 (+1)	23 , 19 (-4)	14 , 14 (0)	10 , 13 (+3)

Table 3. Survey Results (Beginning Survey, End Survey) for All Student Responses as Measured by Number of Individual Responses and Respective Change (+ or -)

Students who moved from “Strongly disagree” or “Disagree” up to “Agree” or “Strongly agree” concerning their self-reported knowledge of coding increased by 33% (Charts 1 and 2).

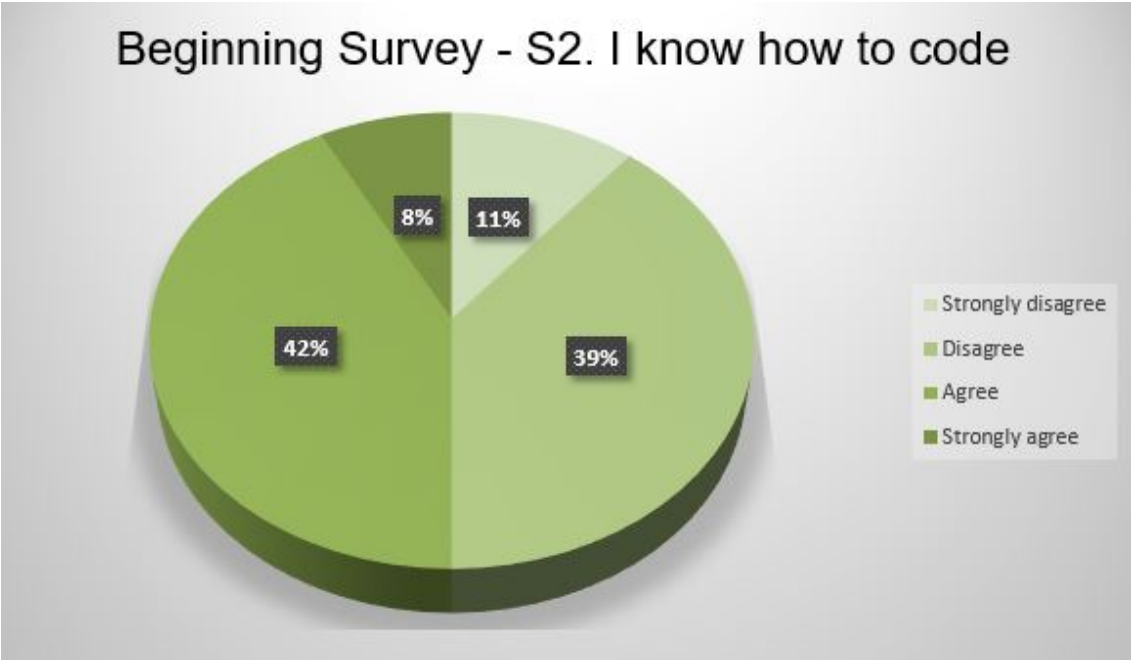


Chart 1. Beginning Survey Results as Measured by Percentage for All Students

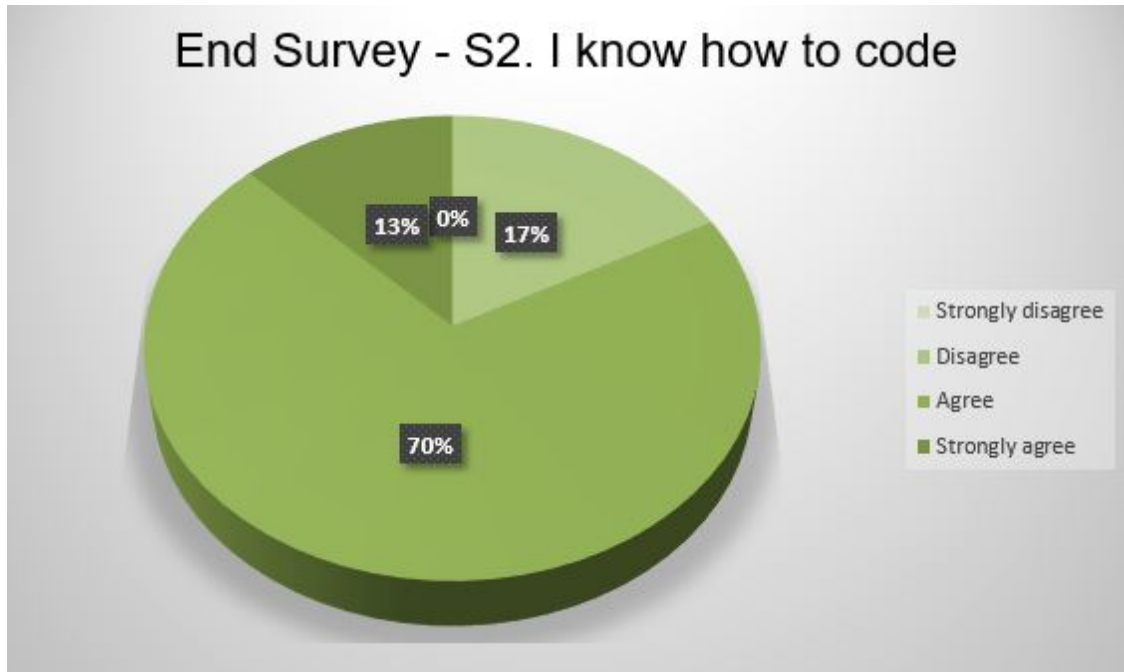


Chart 2. End Survey Results as Measured by Percentage for All Students

The benefit to perceived knowledge of how to code was significant for both the control group ($p = 0.00587$) and experimental group ($p = 0.00021$). However, the effect size was larger for the experimental group ($t = 4.45$) that received stickers for online mastery of content than the control group ($t = 3.23$) that received no external rewards. Tables 4 and 5 contain the collective survey response data for the control group and experimental group respectively. Individual survey and research data are available to view in the Appendix.

The first statement concerning the knowledge of how to use a computer had a significant finding (if significance is considered at $p < 0.10$) for the experimental group with a t value of 2.10 and p value of 0.08710. The control group did *not* have a significant finding ($p = 0.33932$) and a negative effect size ($t = -0.22$) for the first statement. For the third statement concerning learning as its own reward, the control group had a significant result ($p = 0.01104$) and positive effect size ($t = 2.98$). However, the experimental group did *not* have a significant result for the third statement with a p value of 1.59877 and t value of 0.26. Table 6 details all t and p survey results.

	Strongly disagree	Disagree	Agree	Strongly agree
S1. I know how to use a computer	0 , 2 (+2)	0 , 0 (0)	17 , 12 (-5)	15 , 18 (+3)
S2. I know how to code	2 , 0 (-2)	11 , 4 (-7)	15 , 22 (+7)	4 , 6 (+2)
S3. I believe learning is its own reward	2 , 0 (-2)	3 , 5 (+2)	22 , 14 (-8)	5 , 13 (+8)
S4. I perform best under pressure from other people	8 , 6 (-2)	19 , 19 (0)	4 , 6 (+2)	1 , 1 (0)
S5. I like to work at my own pace	0 , 1 (+1)	1 , 0 (-1)	15 , 14 (-1)	16 , 17 (+1)
S6. I am self-motivated	2 , 0 (-2)	6 , 6 (0)	18 , 20 (+2)	6 , 6 (0)
S7. Grades motivate me	1 , 0 (-1)	4 , 4 (0)	16 , 17 (+1)	11 , 11 (0)
S8. Stickers motivate me	8 , 7 (-1)	9 , 12 (+3)	8 , 6 (-2)	7 , 7 (0)

Table 4. Survey Results (Beginning Survey, End Survey) for Control Group as Measured by Number of Individual Responses and Respective Change (+ or -)

	Strongly disagree	Disagree	Agree	Strongly agree
S1. I know how to use a computer	0 , 0 (0)	2 , 0 (-2)	19 , 19 (0)	11 , 13 (+2)
S2. I know how to code	5 , 0 (-5)	14 , 7 (-7)	12 , 23 (+11)	1 , 2 (+1)
S3. I believe learning is its own reward	0 , 0 (0)	7 , 4 (-3)	20 , 25 (+5)	5 , 3 (-2)
S4. I perform best under pressure from other people	5 , 7 (+2)	21 , 16 (-5)	4 , 7 (+3)	2 , 2 (0)
S5. I like to work at my own pace	0 , 0 (0)	0 , 0 (0)	15 , 14 (-1)	17 , 18 (+1)
S6. I am self-motivated	1 , 1 (0)	2 , 4 (+2)	25 , 20 (-5)	4 , 7 (+3)
S7. Grades motivate me	0 , 1 (+1)	2 , 3 (+1)	18 , 14 (-4)	12 , 14 (+2)
S8. Stickers motivate me	9 , 11 (+2)	14 , 7 (-7)	6 , 8 (+2)	3 , 6 (+3)

Table 5. Survey Results (Beginning Survey, End Survey) for Experimental Group as Measured

by Number of Individual Responses and Respective Change (+ or -)

	Control Group		Experimental Group	
	<i>t</i> value	<i>p</i> value	<i>t</i> value	<i>p</i> value
S1. I know how to use a computer	-0.22	0.33932	2.10	0.08710*
S2. I know how to code	3.23	0.00587	4.45	0.00021
S3. I believe learning is its own reward	2.98	0.01104	0.26	1.59877
S4. I perform best under pressure from other people	1.00	0.64992	0.26	1.59877
S5. I like to work at my own pace	0.00	1.00000	0.33	1.48925
S6. I am self-motivated	1.07	0.58400	0.25	1.60470
S7. Grades motivate me	0.53	1.20125	-0.23	0.35649
S8. Stickers motivate me	-0.14	0.21441	0.95	0.70050

Table 6. T-Test Results for Beginning and End Survey Data Comparison

(Significant Results Highlighted in Bold, * is only significant if $p < 0.10$)

Presentation of Research Study Data

The research study did not find a significant difference in performance between the control group and the experimental group ($t = -0.10$, $p = 0.924215$). Chart 3 has data on the percent of lessons voluntarily completed by participants in the research study.



Chart 3. Percentage of Online Lessons Completed by Study Participants

CHAPTER V

DISCUSSION

Summary

The purpose of the study is to explore the relationship between stickers and the intrinsic motivation of students to complete an online computer science course in order to determine if a correlation exists that would justify a major experimental study of sticker efficacy. The research collected will also inform policy decisions at Guardian Angels School regarding stickers.

The investigator surveyed students in grades 6-8 at the beginning and end of a two month period that featured 11 unplugged lessons taught by the investigator regarding principles of coding and computer science. 64 students participated in the research study with 32 students in a control group who received no external rewards and 32 students in an experimental group who received stickers for mastery of online content in the “Computer Science Fundamentals: Express Course” at Code.org. Of the study participants, 59.4% were female and 40.6% were male.

A correlation in performance mastery with regard to the voluntary online content was *not* found to exist between the control and experimental group ($t = -0.10, p = 0.924215$). Overall, the students who received stickers actually did slightly less work than the students who were given nothing at all. The evidence supports the null hypothesis that small tangible rewards (stickers) will not strengthen the intrinsic motivation of students in grades 6-8 to complete an online computer science course.

The survey data had significant results regarding the perceptions students held before and after the two month research study. Both the control and experimental groups showed a benefit to perceived knowledge of how to code that was significant. However, the effect size was larger for the experimental group ($t = 4.45, p = 0.00021$) that received stickers for online mastery of content than the control group ($t = 3.23, p = 0.00587$) that received no external rewards. The experimental group also showed a statistically significant increase (if $p < 0.10$) in the self-reported belief regarding knowledge of how to use a computer ($t = 2.10$) that was not exhibited by the control group. However, the control group showed a significant increase in the self-reported belief that learning is its own reward ($t = 2.98, p = 0.01104$) that was not demonstrated by the experimental group.

Conclusions

From an overall standpoint, stickers do not work to increase the intrinsic motivation of students, and there are significant effects that may have detrimental consequences for students who receive stickers in exchange for exhibiting performance mastery. Stickers seem to inflate a sense of understanding and generate a false conception of abilities as evidenced by the survey responses for the control and experimental groups. The experimental group that received stickers for mastery of online lessons believed they now had knowledge of how to use computers that was not also exhibited by the control group, even though the control group mastered slightly more online lessons on coding. The effect size for the perceived ability to code was also larger for the experimental group ($t = 4.45$) than the control group ($t = 3.23$). These two facts when taken together indicate a pattern of inflated perceptions of ability that do not match the data available in this study.

Stickers rewarded for performance mastery seem to act as a means to give validation to an inflated and inaccurate self-conception of achievement. It is interesting that the control group found learning to be its own reward after spending two months watching their peers be rewarded for the same work they were doing without any positive affirmation. Observing the experimental group significantly increased the intrinsic belief of the control group that learning is its own reward ($t = 2.98, p = 0.01104$). Students who voluntarily completed online coding lessons in the control group clearly did so because they wanted to and not because of an external reward.

Recommendations for Guardian Angels

Based on the existing research and the conclusions of this study, Guardian Angels should keep its existing policy in place. Allowing stickers to be placed on laptops will not lead to an increase in performance mastery and may inflate an inaccurate self-conception of achievement.

Recommendations for Further Research

This research provides insight into the effectiveness of stickers in grades 6-8 in a private Catholic school with little racial or socio-economic diversity. The findings of this study would benefit if replicated in larger and more diverse districts in the public sector.

It is clear that simply participating in the “Computer Science Fundamentals: Express Course” unplugged activities from Code.org was beneficial for the research participants in both the control and experimental groups, which both had significant gains in the perceived ability to code for students. Considering that the aim of Code.org is to expand access to computer science, it may be beneficial for researchers to study the effectiveness of stickers to excite interest in the subject matter, even if the end result leads to an inaccurate conception of actual abilities.

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APPENDIX A

Percentage of Online Lessons Mastered by Study Participants

AVG	GRADE	GROUP	GENDER	LESSON PERCENT
98.83	6	CONTROL	Female	60
97.23	6	EXPERIMENTAL	Female	40
97.03	6	CONTROL	Female	60
96.03	6	EXPERIMENTAL	Female	60
95.89	6	CONTROL	Female	25
95.63	6	EXPERIMENTAL	Female	50
94.97	6	CONTROL	Female	15
94.74	6	EXPERIMENTAL	Female	50
94.66	6	CONTROL	Female	80
93.86	6	EXPERIMENTAL	Female	15
93.77	6	CONTROL	Female	25
85.26	6	EXPERIMENTAL	Female	40
97.86	6	CONTROL	Male	50
94.51	6	EXPERIMENTAL	Male	45
92.43	6	CONTROL	Male	15
89.54	6	EXPERIMENTAL	Male	20
97.49	7	CONTROL	Female	10
97.27	7	EXPERIMENTAL	Female	40
97.03	7	CONTROL	Female	15
96.16	7	EXPERIMENTAL	Female	5
96.11	7	CONTROL	Female	10
96.00	7	EXPERIMENTAL	Female	40
95.95	7	CONTROL	Female	15
95.81	7	EXPERIMENTAL	Female	15
95.62	7	CONTROL	Female	35
95.05	7	EXPERIMENTAL	Female	10
94.95	7	CONTROL	Female	20
94.89	7	EXPERIMENTAL	Female	15
94.81	7	CONTROL	Female	5
94.24	7	EXPERIMENTAL	Female	20
94.03	7	CONTROL	Female	60
92.84	7	EXPERIMENTAL	Female	55
95.92	7	CONTROL	Male	15
94.70	7	EXPERIMENTAL	Male	55
94.30	7	CONTROL	Male	0
94.08	7	EXPERIMENTAL	Male	10
93.97	7	CONTROL	Male	55
93.78	7	EXPERIMENTAL	Male	20
93.46	7	CONTROL	Male	15
92.35	7	EXPERIMENTAL	Male	0
92.27	7	CONTROL	Male	10
90.38	7	EXPERIMENTAL	Male	5
90.35	7	CONTROL	Male	15
89.97	7	EXPERIMENTAL	Male	15
87.86	7	CONTROL	Male	10
85.22	7	EXPERIMENTAL	Male	10
98.51	8	CONTROL	Female	15
95.16	8	EXPERIMENTAL	Female	15
93.70	8	CONTROL	Female	25
93.35	8	EXPERIMENTAL	Female	0
92.41	8	CONTROL	Female	15
92.32	8	EXPERIMENTAL	Female	10
91.97	8	CONTROL	Female	5
88.86	8	EXPERIMENTAL	Female	10
81.73	8	CONTROL	Female	10
78.92	8	EXPERIMENTAL	Female	0
97.91	8	CONTROL	Male	15
96.86	8	EXPERIMENTAL	Male	40
93.05	8	CONTROL	Male	5
91.97	8	EXPERIMENTAL	Male	10
91.11	8	CONTROL	Male	5
90.54	8	EXPERIMENTAL	Male	15
85.78	8	CONTROL	Male	5
81.00	8	EXPERIMENTAL	Male	0

Beginning Survey Responses

AVG	GRADE	GROUP	GENDER	S1	S2	S3	S4	S5	S6	S7	S8	RESPONSES
96.83	6	CONTROL	Female	0.657	0.657	0.657	0.657	0.657	0.657	0.657	1	I think stickers motivate me to succeed because I want to try my best and be the best that I can be.
97.23	6	EXPERIMENTAL	Female	1	0.333	1	0.657	1	0.657	1	0.333	Stickers kind of motivate me to succeed but at the same time I don't really care for them.
97.03	6	CONTROL	Female	0.657	0.657	1	0	1	1	1	0	Yes, because they do help me in any shape or form.
96.03	6	EXPERIMENTAL	Female	1	0.333	0.333	0	1	0.657	0.657	1	Yes, because we have a sticker sheet and if you get your homework done you get a sticker and when you finish you get another sticker sheet once your first sticker sheet got filled out and for that one you can choose either a No, because I don't really care for them.
95.69	6	EXPERIMENTAL	Female	0.657	0.657	0.333	0.333	0.657	0.657	0.333	0	Stickers don't help motivate me because they may be fun but when you are given a task that you must carry out all the way you must focus on that, not the stickers.
94.97	6	CONTROL	Female	1	1	0.333	0	1	0.333	0.333	1	Stickers help motivate me because they remind me that what I do is important even if it's a bit.
94.74	6	EXPERIMENTAL	Female	0.657	0.657	0.657	0	1	0.657	1	0	Stickers don't motivate me because they really aren't an award to me and they are just some paper with some stick stuff on the back so I think I would like something better, but I will accept one if you give one to me. :)
94.69	6	CONTROL	Female	0.657	0.333	1	0.333	0.657	0.333	0.657	0	No, they do not motivate me though I do enjoy being awarded for my accomplishments.
93.95	6	EXPERIMENTAL	Female	0.657	0.333	0.333	0.333	0.657	0.657	0.657	0.333	No, because it's just a sticker and it's not really a sticker collector but it would be cool to just on my tablet.
93.77	6	CONTROL	Female	1	1	0.657	0	0.657	0	1	0	They don't help because I know that even if I don't get a sticker I will have other things that make me be
95.26	6	EXPERIMENTAL	Female	1	0.657	0.657	0.333	0.657	0.657	0.657	0.333	No, stickers do not motivate me because I just am not that into them that much so it is not that much of an award
94.51	6	EXPERIMENTAL	Male	0.657	0.333	0.657	0.333	1	0.657	0.657	0	I think stickers do not motivate me because stickers are useless and do not help me to succeed.
92.43	6	CONTROL	Male	1	0.657	0.333	0.333	1	0.657	0.657	0.657	No they don't, if I had to choose would I rather have a sticker for doing my work or get nothing I would just choose nothing, I don't need a little sticky piece of paper to motivate me! I'm motivated by the thought this will help me in good of themselves for earning it but not me.
99.54	6	EXPERIMENTAL	Male	1	0.657	1	0.333	0.657	0	1	0.333	nothing, I don't need a little sticky piece of paper to motivate me! I'm motivated by the thought this will help me in good of themselves for earning it but not me.
97.46	7	CONTROL	Female	1	0.657	0.657	0.657	1	0.657	1	1	Stickers help motivate me to succeed because I love stickers and in order to get the stickers I must do well.
97.27	7	EXPERIMENTAL	Female	0.333	0	0.657	0.333	0.657	0	0.657	0	No, because they are just a piece of paper.
97.03	7	CONTROL	Female	0.657	0.657	0.657	0.333	0.657	0.657	0.657	0.657	Stickers don't help me motivate because it is just paper.
96.76	7	EXPERIMENTAL	Female	0.657	0.333	0.657	0.333	0.657	0.657	0.657	0.333	Stickers don't help me motivate because I love stickers and in order to get the stickers I must do well.
96.11	7	CONTROL	Female	1	0.657	0.657	0.333	0.657	0.657	1	1	Stickers don't help me motivate because I love stickers and in order to get the stickers I must do well.
96.00	7	EXPERIMENTAL	Female	0.657	0.333	0.657	0.333	0.657	0.657	1	1	I think they motivate me because then you can show people how far you've gotten in the code program, and they help track my progress.
95.81	7	EXPERIMENTAL	Female	0.657	0.333	1	0.333	0.657	0.657	1	0.333	No, because I don't really care about them because I am self
95.82	7	CONTROL	Female	0.657	0.333	0.657	0.333	0.657	0.657	1	0	Stickers do not help me motivate because they do not have anything special to them, they are just sticky pieces of paper.
95.06	7	EXPERIMENTAL	Female	0.657	0.657	0.657	0.333	0.657	0.657	0.657	0.333	Stickers can motivate me to succeed in some situations, but I'm not sure.
94.96	7	CONTROL	Female	1	1	1	0.333	1	1	0.657	1	The motivate me to succeed because they are fun to look at all of the different patterns on them. They also make me work harder because they are a reward for it.
94.89	7	EXPERIMENTAL	Female	0.657	0.657	1	0.333	1	0.657	0.657	0.333	Stickers do not really motivate me to succeed because they are just little sticky things. But I have never been rewarded with stickers before so it might help me succeed.
94.81	7	CONTROL	Female	0.657	0.657	0.657	0.333	1	0.657	0.657	0.657	A little bit because I want the stickers but I don't know really what they are.
94.24	7	EXPERIMENTAL	Female	1	0.657	0.657	0.333	1	1	1	1	Stickers do not motivate me nor do they discourage me. I just don't really care about them because I am self
92.94	7	EXPERIMENTAL	Female	0.657	0.657	0.657	0.333	1	0.657	0.657	0.657	No, because they are just stickers.
95.92	7	CONTROL	Male	1	0.657	0.657	0.333	1	1	1	0.657	No, because they have really have no purpose other than decoration.
94.70	7	EXPERIMENTAL	Male	0.657	0.333	0.657	0.333	1	0.657	0.657	0.657	Why because why not
94.30	7	CONTROL	Male	0.657	0.333	0	0.333	1	0.657	0.657	0	Stickers help me motivate because I need to get the reward of having a sticker on my tablet.
94.08	7	EXPERIMENTAL	Male	0.657	0.333	0	0.333	0.657	0.657	1	1	No they do not because I don't care what's on my tablet
93.97	7	CONTROL	Male	1	0.657	0	0	1	0.333	0.657	0.657	Stickers help motivate me by reminding of the skills or good deeds I have done, willing me that I can do this.
93.78	7	EXPERIMENTAL	Male	0.657	0.333	0.657	0.333	1	0.657	0.657	0.333	They do, because the really motivate.
93.46	7	CONTROL	Male	1	0	0.657	0	0.657	0.657	1	1	Not really, I don't see the value of my time in them.
92.36	7	EXPERIMENTAL	Male	0.657	0.333	0.657	0.333	0.657	0.657	1	0	Yes, because it gives you something to work for.
92.27	7	CONTROL	Male	0.657	0.333	0.333	0.333	0.657	0.657	0.657	0.333	They don't motivate me because I don't really care about stickers.
90.36	7	EXPERIMENTAL	Male	1	0.657	0.657	0.333	0.657	1	0.657	0	No, because they do not have much worth and are just a piece of paper pretty much.
90.28	7	CONTROL	Male	1	0.657	0.657	0.333	0.657	1	0.657	0	No, because their stickers and they are useless.
89.97	7	EXPERIMENTAL	Male	1	0	0.657	0.333	0.657	0.657	0.657	0.333	No, because they are just pieces of paper that are sticky.
87.96	7	CONTROL	Male	0.657	0.333	0.657	0.333	0.657	0.333	0.333	0.657	NO because they don't mean anything.
85.22	7	EXPERIMENTAL	Male	0.657	1	0.657	0.333	0.657	0.657	1	0	They bring me excitement
86.51	8	CONTROL	Female	1	0.333	0.657	0.657	1	0.657	0.657	1	No, because it seems dumb.
85.70	8	EXPERIMENTAL	Female	0.657	0.657	1	0	1	0.657	0.657	1	Stickers help motivate me to succeed because it gives you something special after accomplishing something.
93.70	8	CONTROL	Female	0.657	0.333	0.657	0	1	0.657	0.657	0.333	Yes, because those stickers!!!!!!!
93.36	8	EXPERIMENTAL	Female	0.657	0	1	0.657	0.657	1	1	0.657	No, because stickers do not really have an impact on me.
												Sometimes because they have positive messages

End Survey Responses

AVG	GRADE	GROUP	GENDER	S1	S2	S3	S4	S5	S6	S7	S8	RESPONSES
98.83	6	CONTROL	Female	1	1	1	1	1	0.667	1	1	Sticker's help motivate me to succeed because it helps me to keep going and keep participating in the activity.
97.23	6	EXPERIMENTAL	Female	1	0.667	0.667	0.333	1	0.667	1	1	Yes they do because I like how they look on my tablet.
97.03	6	CONTROL	Female	0	1	1	0.333	0.667	1	1	1	Yes, they make me want to get more the more I work harder.
96.03	6	EXPERIMENTAL	Female	1	0.667	0.333	0	1	0.667	0.667	1	I think sticker's motivate you because they are very cool, I think sticker's are a reward and they are better than not getting anything.
95.89	6	CONTROL	Female	1	0.667	0.667	0.333	0	0.667	1	0.333	No, because sticker do nothing good for me.
95.63	6	EXPERIMENTAL	Female	1	1	0.667	0	1	0.667	0.333	1	They do help, because if you know that you're going to get a reward of sort then you'd do anything to get the reward in this case it's stickers.
94.97	6	CONTROL	Female	1	1	0.667	0	1	0.333	0.667	1	Sticker's help motivate me to succeed because even if they're small, it's still my favorite reward for me to do almost anything. And they're super cute!
94.74	6	EXPERIMENTAL	Female	1	0.667	0.667	0.333	0.667	0.333	0.667	1	Sticker's motivate me because I think that it just helps me think that I am doing good and it makes me think that I can really cook and do things very well on my own.
94.66	6	CONTROL	Female	1	1	0.667	0.333	1	1	1	0	Yes, because it is just fun to get them.
94.06	6	EXPERIMENTAL	Female	0.667	0.667	0.667	1	1	1	0.667	0	No because it is just fun to get them.
93.77	6	CONTROL	Female	1	0.667	0.667	0.667	0.667	0.333	0.667	0.667	No because they are sometimes well but most of the time they just are and I don't always think about them, but they are helpful sometimes.
93.26	6	EXPERIMENTAL	Female	1	0.667	0.667	0.667	1	0.667	0.667	0.667	Yes, to see how I'm doing.
91.86	6	CONTROL	Male	0.667	0.667	1	0.333	1	0.667	0.667	0.667	No, because sticker are useless to me because they don't serve a purpose.
94.51	6	EXPERIMENTAL	Male	1	0.667	0.667	0.333	1	0.667	1	0.667	No, not that much.
92.43	6	CONTROL	Male	0.667	0.667	0.667	0.333	1	0.333	0.667	0	No, they do not I have not wanted to really work for stickers they don't really make me want to do more than maybe 1 lesson.
89.54	6	EXPERIMENTAL	Male	1	0.667	0.667	0	1	0.667	0.333	0.333	Sticker's don't help me to get motivated because there are more important things to be motivated by.
97.48	7	CONTROL	Female	1	0.667	1	0.333	0.667	1	0.667	1	They motivate me to succeed because I love stickers and more I do, the more stickers I get and that is good.
97.27	7	EXPERIMENTAL	Female	0.667	0.667	0.667	0.333	0.667	1	0.667	0.333	No, because they are a piece of paper.
97.03	7	CONTROL	Female	0.667	0.667	0.667	0.333	1	0.667	1	0.667	They are cool stickers.
96.16	7	EXPERIMENTAL	Female	0.667	0.333	0.667	0.333	0.667	0	0	0.333	No because they don't affect my grades.
96.11	7	CONTROL	Female	1	0.667	0.667	0.333	0.667	1	1	1	Yes, they motivate me to succeed because I clearly a sticker as a reward and I like to be rewarded for my successes.
96.00	7	EXPERIMENTAL	Female	0.667	0.667	0.667	0	0.667	1	1	0	No, they do not motivate me because I dislike sticker's really.
95.95	7	CONTROL	Female	0.667	0.667	1	0	0.667	0.667	0.667	0.333	No, not for me personally but for other people who are interested in stickers then that could motivate others.
95.81	7	EXPERIMENTAL	Female	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.333	No, however I know others motivated by stickers.
95.62	7	CONTROL	Female	1	0.667	1	0.333	0.667	0.667	1	0.333	No, they don't really mean much to me.
95.05	7	EXPERIMENTAL	Female	1	0.667	0.667	0.667	0.667	0.667	0.667	0.667	Yes because they show others that you achieved something.
94.95	7	CONTROL	Female	1	1	1	0	1	1	1	0.333	No they don't because I just have to have fun with the activity no matter what the rewards.
94.89	7	EXPERIMENTAL	Female	0.667	0.667	0.667	0.333	0.667	0.667	0.667	0.667	I think sticker do because once you see other people with stickers then they are motivated to also get stickers.
94.81	7	CONTROL	Female	0.667	0.667	1	0.333	1	0.667	1	0.667	Yes because it's way to show other people that you did something new and cool.
94.24	7	EXPERIMENTAL	Female	1	0.333	0.667	0.333	1	1	1	0	No they don't really motivate me because I am not a fan of large stickers.
94.03	7	CONTROL	Female	1	0.667	1	0.333	1	0.667	0.667	0.333	No because they don't really mean anything to me.
92.84	7	EXPERIMENTAL	Female	0.667	0.667	0.667	0.667	1	0.667	0.667	0.667	Yes, because when I saw other people have stickers it made me want more.
95.92	7	CONTROL	Male	1	0.667	0.667	0.333	1	0.667	0.667	0	No because the stickers that I saw other people get looked stupid.
94.70	7	EXPERIMENTAL	Male	0.667	0.667	0.333	0.333	0.667	0.667	0.667	0	No because they usually stay on the surface for a while but they usually fall off in a month.
94.36	7	CONTROL	Male	0.667	0.667	0.333	0.667	0.667	0.333	0.667	0	No they don't because I don't care about sticker's and I don't even get any.
94.06	7	EXPERIMENTAL	Male	0.667	0.667	1	1	0.667	0.667	1	1	Sticker's help motivate me because they remind me that I have succeeded before and I can overcome this obstacle.
93.97	7	CONTROL	Male	1	1	0.333	0	1	0.667	0.667	0.333	There just not that cool.
93.78	7	EXPERIMENTAL	Male	0.667	0.667	0.667	0.333	0.667	0.667	0.667	0.667	I like being rewarded for what I earn.
93.46	7	CONTROL	Male	1	0.667	0.667	0	1	0.333	0.667	0.667	Yes because it gives you something to work for.
92.35	7	EXPERIMENTAL	Male	0.667	0.333	0.333	0.333	1	0.667	0.667	0	Sticker's don't help motivate me because they don't help with anything.
92.27	7	CONTROL	Male	0.667	0.667	0.333	0.333	0.667	0.667	0.667	0	No because they are a piece of paper that stick to something.
90.36	7	EXPERIMENTAL	Male	1	1	1	0.333	0.667	1	0.667	0	Sticker's do not help me motivate to succeed because they just sticker are not something of value.
90.35	7	CONTROL	Male	1	0.667	0.333	0.333	1	0.667	0.667	0.333	Yes because stickers make me want to decorate my tablet and its better than nothing.
89.97	7	EXPERIMENTAL	Male	0.667	0.667	0.667	0.333	1	0.667	0.667	0.333	No, stickers don't motivate me because anybody can go get stickers at the dollar store.
89.22	7	EXPERIMENTAL	Male	1	0.667	0.333	0.667	0.667	0.667	0.667	0	Yes bring's joy.
89.51	8	CONTROL	Female	1	0.667	0.667	0.333	0.667	0.667	0.667	0.667	No, because I feel like they are not needed.
94.16	8	EXPERIMENTAL	Female	0.667	0.667	0.667	0.333	1	0.667	1	1	Sticker's help motivate me because they are fun.
												Yes because they are fun and entertaining.

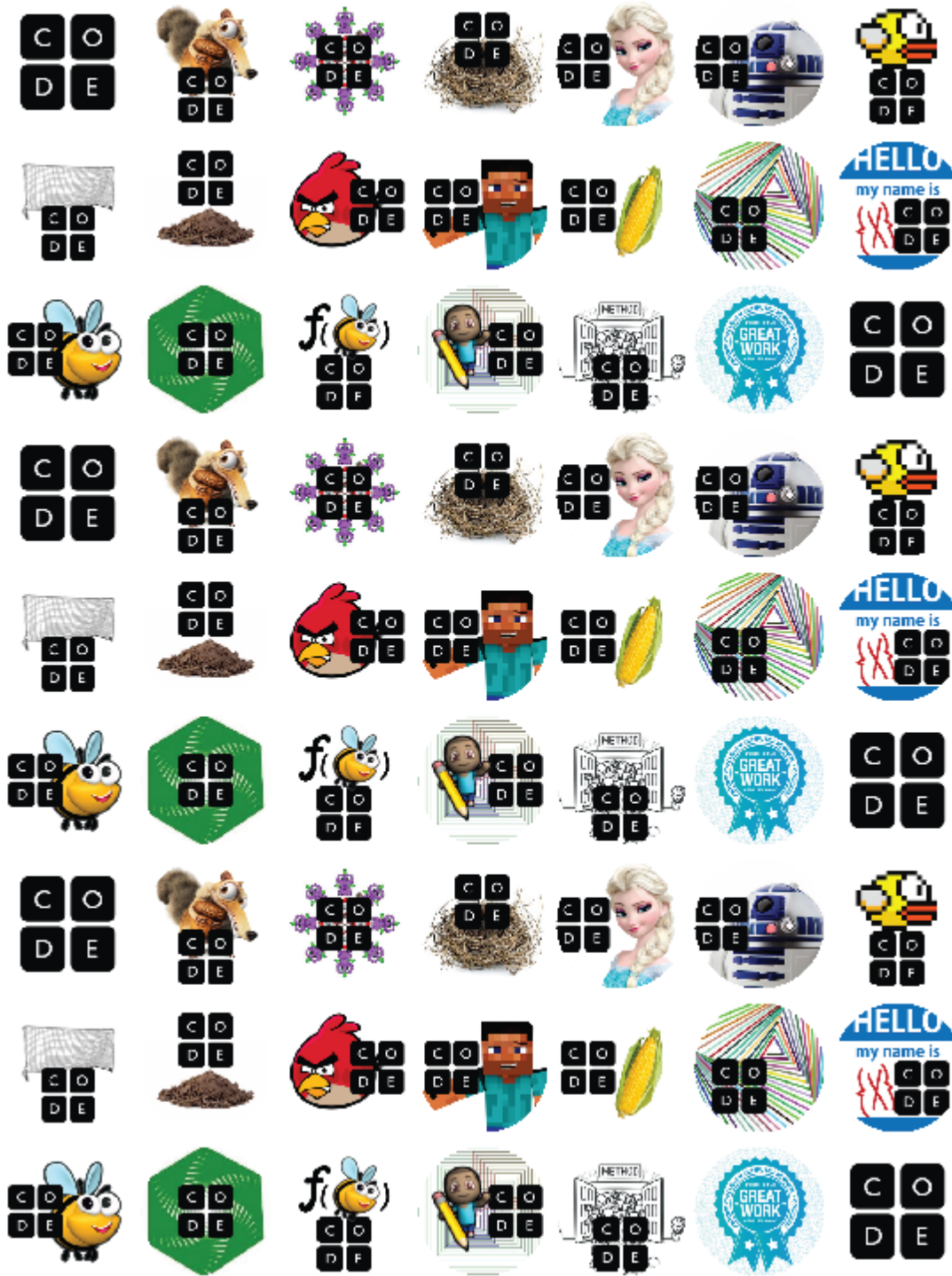
93.70	8	CONTROL	Female	0.667	0.667	1	0.333	1	0.667	0.667	0.333	0.667	0.333	1	1	0	0.667	0.333	I do not think stickers motivate me to succeed because they are very small and unimportant to me.
93.35	8	EXPERIMENTAL	Female	0.667	0.333	0.667	0.333	0.667	1	1	0.667	0.667	0.333	0.667	0.333	0	0.667	0.333	Yes, because if they have motivational sayings on them.
92.41	8	CONTROL	Female	0.667	0.667	0.667	0	0.667	0.333	0.667	0.333	0.667	0.333	0.667	0.333	0	0.667	0.333	No, because they have no impact on me.
92.32	8	EXPERIMENTAL	Female	0.667	0.333	0.333	0.333	0.667	0.333	0.333	0.333	0.667	0.333	0.333	0.333	0	0.667	0.333	No, because they have no impact on me.
91.97	8	CONTROL	Female	1	0.333	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0	0.667	0.667	I don't care about stickers because I didn't like the design.
88.86	8	EXPERIMENTAL	Female	1	0.667	0.667	0	1	0.667	1	0.667	1	0.667	1	0.667	1	0.667	0.667	Yes because they remind me of things.
81.73	8	CONTROL	Female	0.667	0.667	0.667	0.333	1	0.667	1	0.667	1	0.667	1	0.667	1	0.667	0.667	Yes because stickers shouldn't decide how smart you are or good you are at something.
78.92	8	EXPERIMENTAL	Female	1	0.667	0.667	0.667	0.667	1	1	0.667	1	0.667	1	0.667	1	0.667	0.667	no because its not important to me
97.91	8	CONTROL	Male	0.667	0.333	1	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0	0.667	0.667	no because its not important to me
96.86	8	EXPERIMENTAL	Male	0.667	0.667	0.667	0.667	0.667	1	1	1	1	1	1	1	0	0.667	0.667	Stickers do not motivate me because stickers are just paper
93.05	8	CONTROL	Male	1	0.667	1	0.333	1	1	1	1	1	1	1	0	0.667	0.667	Stickers do not motivate me to succeed because I see them a very cliché, and for me getting a good grade is my motivation.	
91.97	8	EXPERIMENTAL	Male	0.667	0.333	0.667	1	1	1	1	1	1	1	1	0	0.667	0.333	Stickers don't motivate me because they are for little kids	
91.11	8	CONTROL	Male	0	0.333	0.333	0.667	0.667	0.667	0.667	0.333	0.667	0.333	0.667	0.333	0.667	0.333	no cause they are worthless	
90.54	8	EXPERIMENTAL	Male	0.667	0.667	0.667	0	1	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	no because its just a sticker it has no meaning or value	
85.78	8	CONTROL	Male	1	0.667	1	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	0.667	yes if they look cool	
81.00	8	EXPERIMENTAL	Male	0.667	0.333	0.667	0.667	0.667	1	0.667	1	0.667	1	0.667	1	0	0.667	0.667	No not at all I dont need stickers

Two Month Calendar for Delivery of Unplugged Lessons

6-8 Calendar: March – end 2018



















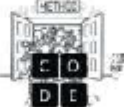

Monday	Tuesday	Wednesday	Thursday	Friday
3/12(1&5)	3/13(3&6) HB Code.org Express Course Lesson 1 Permission Slips Sent Home	3/14(7&8) Mass	3/15 HB Collect Permission Slips Beginning Research Survey Intro to Code.org	3/16(1&5)
3/19(3&6)	3/20(7&8) HB Code.org Express Course Lesson 2	3/21(1&5) No Mass Singin' in the Rain A.M. Run-through 1:00 Dress Rehearsal	3/22 HB Code.org Express Course Lesson 3	3/23(3&6) Server Practice 1:15 All-School Tableaus 9:00
3/26(7&8)	3/27(1&5) Spring Pictures Server Practice 1:15 HB Code.org Express Course Lesson 4	3/28 (3&6) All-School Mass 8:15 Server Practice 1:15	3/29 Holy Thursday No School	3/30 Good Friday No School
4/2 Easter Break	4/3 Easter Break	4/4 Easter Break	4/5 Easter Break	4/6 Easter Break
4/9(7&8)	4/10(1&5) HB Code.org Express Course Lesson 10	4/11(3&6) Mass	4/12 HB Code.org Express Course Lesson 11	4/13(7&8) MadCap Puppets Gr. 8 & 1 PM
4/16	4/17 HB Code.org Express Course Lesson 12	4/18	4/19 HB Code.org Express Course Lesson 16	4/20 Everybody Counts
4/23	4/24 HB Code.org Express Course Lesson 21	4/25	4/26 HB Code.org Express Course Lesson 24	4/27 Faculty In-service
4/30 DC Trip	5/1 DC Trip	5/2 DC Trip	5/3 DC Trip	5/4 DC Trip
5/7	5/8 HB Code.org Express Course Lesson 27	5/9 May Crowning 1:30	5/10 HB End Research Survey	5/11 1:15 Spring Pep Rally
5/14	5/15	5/16 Mass	5/17 Spring Concert	5/18 Grade 8 A.M. Possible SS Fair P.M. Possible Variety Show Practice
5/21 Grade 8 Possible Variety Show Practice	5/22 All School Mass Variety Show	5/23 9:15 Awards 6:30 Graduation Mass	5/24	5/25 Field Day
5/28 Memorial Day	5/29	5/30	5/31 Grade 7 to Reds	6/1 9:00 Mass 10:00 Closing Ceremony 11:00 Dismissal

Custom Sticker Sheet Designed for Avery 1-Inch Diameter Round Labels (6450)



Stickers Awarded for Performance Mastery of Online Lessons at Code.org

Lesson Completion Stickers

Lesson 2 	Lesson 4 	Lesson 6 	Lesson 7 
Lesson 8 	Lesson 13 	Lesson 14 	Lesson 15 
Lesson 17 	Lesson 18 	Lesson 19 	Lesson 20 
Lesson 22 	Lesson 23 	Lesson 25 	Lesson 26 
Lesson 28 	Lesson 29 	Lesson 30 	End of Course Project 

Lesson Progress Legend

Level Type	Level Details	Level Status				
		Not started	In progress	Completed the map & code	Completed the full	Submitted
Course	<input type="checkbox"/> Full <input type="checkbox"/> Value <input type="checkbox"/> Map			N/A		N/A
Activity	<input type="checkbox"/> Not triggered <input type="checkbox"/> Online <input checked="" type="checkbox"/> Completed					

Lesson Content Outline for Online Lessons at Code.org

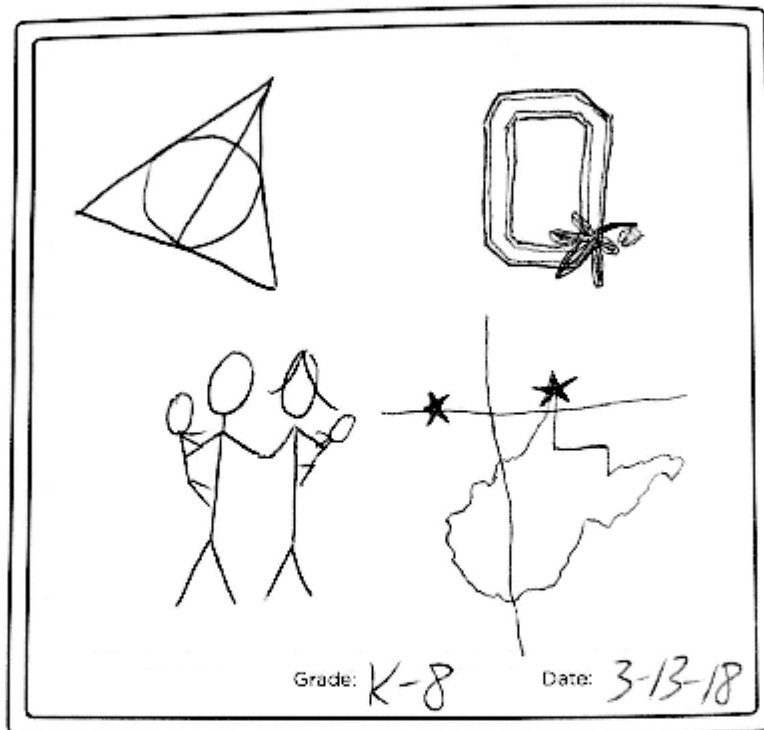
Lesson Content Outline

Lesson Name	Topics
1. Getting Started with Code	Unplugged Activity
2. Introduction	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
3. Building a Game	Unplugged Activity
4. Building a Game	1 2 3 4 5 6 7 8 9 10
5. Building a Game	Unplugged Activity
6. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
7. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
8. Building a Game	1 2 3 4 5 6 7 8 9 10
9. Building a Game	Unplugged Activity
10. Building a Game	Unplugged Activity
11. Building a Game	Unplugged Activity
12. Building a Game	Unplugged Activity
13. Building a Game	Unplugged Activity
14. Building a Game	Unplugged Activity
15. Building a Game	1 2 3 4 5 6 7 8 9 10 11
16. Building a Game	1 2 3 4 5 6 7 8 9 10 11
17. Building a Game	1 2 3 4 5 6 7 8 9 10
18. Building a Game	Unplugged Activity
19. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
20. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
21. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
22. Building a Game	Unplugged Activity
23. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
24. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
25. Building a Game	Unplugged Activity
26. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
27. Building a Game	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
28. Building a Game	1 2 3 4 5 6 7 8 9 10
29. Building a Game	Unplugged Activity
30. Building a Game	1 2 3 4 5 6 7 8 9 10
31. Building a Game	1 2 3 4 5 6 7 8 9 10
32. Building a Game	1 2 3 4 5 6 7 8 9 10
33. Building a Game	1 2 3 4 5 6 7 8 9 10
34. Building a Game	1 2 3 4 5 6 7 8 9 10
35. Building a Game	1 2 3 4 5 6 7 8 9 10

Lesson Name	Topics
36. Building a Game	1 2 3 4 5 6 7 8 9 10
37. Building a Game	1 2 3 4 5 6 7 8 9 10
38. Building a Game	1 2 3 4 5 6 7 8 9 10
39. Building a Game	1 2 3 4 5 6 7 8 9 10
40. Building a Game	1 2 3 4 5 6 7 8 9 10

Mr. Buck

This journal belongs to



My Think Spot Journal

Lesson 1

3-13-2018

Date:

Algorithm - A list of steps that you can follow to finish a task.

Program - An algorithm that has been coded into something that can be run by a machine.

Code.org

3-15-2018

Date:

Lesson 2		Lesson 19	
Lesson 4		Lesson 20	
Lesson 6		Lesson 22	
Lesson 7		Lesson 23	
Lesson 8		Lesson 25	
Lesson 13		Lesson 26	
Lesson 14		Lesson 28	
Lesson 15		Lesson 29	
Lesson 17		Lesson 30	
Lesson 18		End of Course Project	

Complete by May 10

Lesson 3

3-20-2018

Date:

Frustrated - Feeling annoyed or angry because something is not the way you want it.

Persistence - Trying again and again, even when something is very hard.

"Be The Mouse"

Lesson 5

3-22-2018

Date:

Loop - The action of doing something over and over again.

Repeat - Do something again.

Lesson 9

3-27-2018

Date:

DNS - The service that translates URLs to IP addresses.

DSL/Cable - A method of sending information using telephone or television cables.

Fiber Optic Cable - A connection that uses light to transmit information.

Internet - A group of computers and servers that are connected to each other.

IP Address - A number assigned to any item that is connected to the Internet.

Packets - Small chunks of information that have been carefully formed from larger chunks of information.

Servers - Computers that exist only to provide things to others.

URL - An easy-to-remember address for calling a web page (like www.code.org).

Wi-Fi - A wireless method of sending information using radio waves.

"The internet is a wire."

Lesson 10

4/10/2018

Date:

Digital Citizen - Someone who acts safely, responsibly, and respectfully online.	
Personal Information	
Safe	Unsafe
* Favorite Food * Opinion (respectfully) * First name (w/permission)	* Mother's maiden name * Social Security number * Date of birth * Phone number * Address * School

Thumper Rule: "If you don't have anything nice to say, don't say anything at all."

Lesson 11

4/12/2018

Date.

Bullying - Behavior that is purposefully mean or scary to someone else.

Cyberbullying - Doing something on the internet, usually again and again, to make another person feel angry, sad, or scared.

Online - Connected to the internet.

Lesson 12

4/17/2018

Date:

Event - An action that
causes something to happen.

Lesson 16

4/19/2018

Date:

Conditionals - Statements that
only run under certain
conditions.

Lesson 21

4/24/2018

Date:

Variable - A placeholder for
a piece of information
that can change.

Lesson 24

4/26/2018

Date:

For Loop - Loops that have a predetermined beginning, end, and increment (step interval).

Lesson 27

5/8/2018

Date:

Function - A named group of programming instructions.

Functions are reusable abstractions that reduce the complexity of writing and maintaining programs.

Parameter - An extra piece of information passed to a function to customize it for a need.

Computer Science Survey

Preview & Test

0/14 answered

DELETE TABLE PHONE

* 1. What is your gender? Female Male

* 2. What is your first name?

* 3. What is your last name?

* 4. What is your "6240XXXX" number?

* 5. What is your grade? 6 7 8

NEXT

* 6. I know how to use a computer Strongly disagree Agree Disagree Strongly agree

* 7. I know how to code Strongly disagree Agree Disagree Strongly agree

* 8. I believe learning is its own reward Strongly disagree Agree Disagree Strongly agree

* 9. I perform best under pressure from other people Strongly disagree Agree Disagree Strongly agree

* 10. I like to work at my own pace Strongly disagree Agree Disagree Strongly agree

* 11. I am self-motivated Strongly disagree Agree Disagree Strongly agree

* 12. Grades motivate me 

- Strongly disagree
- Disagree
- Agree
- Strongly agree

* 13. Stickers motivate me 

- Strongly disagree
- Disagree
- Agree
- Strongly agree

* 14. Do stickers help motivate you to succeed? Why or why not? 

PREV DONE



Informed Parental Consent Form



Informed Parental Consent Form

We invite you and your child to take part in a research study being conducted by Robert Buck, who is the Technology Coordinator at Guardian Angels School and also a student at Xavier University, as part of his graduate research. This study, as well as your rights as a participant, are described below.

Description: This study will examine whether small tangible rewards strengthen the intrinsic motivation of students in grades 6-8 to complete a voluntary academic program focused on computer science. Some participants may receive small tangible rewards for accomplishing academic achievements. All participants will complete a short survey at the beginning and end of the research study. The study will conclude in approximately seven weeks. Your child's identity will not be revealed to anyone but the principal investigator, Robert Buck.

Confidentiality: Each child will be given an identification number for the purpose of the research study, and no personally identifiable information about your child will be published.

Risks & Benefits: There are no discernible risks to your child. There are potential benefits for your child to learn from lessons in computational thinking. Some study participants will also receive small tangible rewards with a total value of less than a dollar.

Freedom to Withdraw or Refuse Participation: You and your child are free to withdraw from this research study even after granting permission to participate below. You and your child may refuse participation at any time.

Questions? Please feel free to ask the investigator, Robert Buck, any questions before signing the consent form or at any time during or after the study.

Principal Investigator: Robert Buck, Technology Coordinator, Guardian Angels School; 513-624-2190; rbuck@gaschool.org

Informed Consent Statement

I, _____ (please print), give permission for my child, _____ (please print), to participate in the above research study.

The research study has been explained to me and my questions have been answered to my satisfaction. I understand that my child's right to withdraw from participating or refusal to participate will be respected and that my child's identity will be kept confidential. I give this consent voluntarily.

Parent/Guardian Signature:

Signature

Date

Student Signature:

Signature

Date