A Solution to the "I-Never-Do-the-Text-Reading-Assignment" Problem

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Abstract

An integral part of student resistance to follow well thought-out course syllabi and assignments, is the widespread practice of seldom (never?) reading the assigned text material before hearing the lecture, or completing the homework assignment on the scheduled topic. Three years ago, the introduction of a simple technique has "changed everything". The method, called "Reading Summaries" (RS), requires a randomly selected, three person student team to present, at the outset of every class period, a five to eight minute oral summary of the session's reading assignment. Each Team member must present an individual, separate portion of the assignment in a two to three minute talk, which must close with a "link" and "most important point". Each Team's presentation is graded by all student teams, but not by the instructor. The Team's RS grade is given to all members of the Team, and counts meaningfully to the individual's course grade. At the end of the course, each student is asked to complete a critique form of the RS. With three years experience, the RS method has spawned interesting variations, refinements. Using the RS technique in ten course presentations of eight different technical and non-technical subjects, has resulted in a number of unintended benefits for the students, and remarkable, an eighty seven percent student approval rating.

Introduction

All engineering faculty have experienced that rush of enthusiasm in starting to lecture on a new topic in the course we are teaching, only to look out on a field of faces whose expressions convey not the slightest recognition for a single word or concept presented in the first five minutes of our brilliantly composed opening statement. How could these students be acting as if these terms, which you are so clearly presenting, are completely new and never before seen or heard? Didn't they receive a detailed syllabus and a well developed course structure, with thoughtfully assigned, reasonable reading assignments for each and every lecture session? Every student was present at our first meeting when the syllabus was explained and the importance of completing the reading assignments before the topic was presented in lecture, and particularly, before starting the homework for the topic, was emphasized. You mean they aren't following this sage advice?

The answer, sadly, is "NO", at least for all the courses this author has taught (before "RS"s). Additionally, experience has shown, that most students do not pre-read the reading assignments for most of their engineering classes they take during their undergraduate training. Why is this the case ? While a single explanation won't fit every student, two general characteristics could contribute to this widespread problem. First, their learning skills, and maturity, are simply not well enough developed. They are, recall, for the most part, products of a public-school education where none of these engineering-school-type of assignments are required? A more important explanation, perhaps, is a second guess. Our engineering schools, are infamous for "working our students to death", with many, many technically demanding courses, laboratories, long & many homework assignments, design

projects and reports, and challenging examinations. With young students of underdeveloped time-management skills, it should not be a surprise to find many (most?) running "behind the curve" with the large work-load we properly require of them. In their constant juggle to get everything done, dropping the "reading assignment" off the "to do" list is, to them, a logical prioritization. After all, they correctly reason, there is, in not completing the reading assignment, no direct "penalty" for that choice (read, no immediate poor GRADE).

After these observations, together with the long-ago discovery that the "stick" technique (read, "penalty") is not a good motivator in teaching, it occurred to this author that the "carrot" (read, "reward") approach might work with this behavior modification problem. Namely, give the students a reward for reading the text assignment before the lecture and homework assignment. Profoundly simple, but how?

Method

Since its inception Mercer University School of Engineering (MUSE) has developed a curriculum which places a strong emphasis on two important, non-technical, engineering training areas: Team Building (TB) and Technical Communication (TC). While too expansive to detail here, these efforts provide an important foundation for the Reading Summary (RS) method reported in this paper. At MUSE, TB and TC start in the Freshmen year, and are integrated into all programs, many courses and design projects throughout all four years of our undergraduate training. The Mercer students, therefore, who come into my upper level classes, are thoroughly exposed and very comfortable with TB and TC. An additional existing condition which made the development of Reading Summaries organizationally simple, was that the classes were already divided into two and three member Teams, all designated with a single-letter, identifying code. This was possible because, after the methods of Felder (1994), I have used homework and design project Teams to complete cooperative assignments in all my classes, since being introduced to these successful methods in 1995.

Initial Reading Summary Form

The primary objective of the Reading Summary (RS) was to entice all the students to read the full text reading assignment prior to the lecture & the homework assignment on the topic. Secondary objectives were to give the students an opportunity to "teach", to practice their oral presentations, and to learn (for the first time?) how to make value-judgements & decisions about technical material they had read. The initial format for RS presentations was as follows:

At the start of every lecture period, one of the class's teams (one of four to six) was selected to provide the day's RS. The selection was by a random method consisting of a lottery-like, transparent container of ping-pong balls, one for each team, marked by the team's identifying letter. The instructor shakes the container, and lets one ball fall into his hand to select the day's presenting team.

All members of the selected team come to the head of the class and present a five to eight minute oral summary of the day's text reading assignment. The instructor takes his seat among the students. All team members must participate by giving individual two to three minute summaries of an approximately equal portion the assignment. Each presenter is forced, by the time constraint, to be judicious in the points he/she talks about. Additionally, each is required to conclude their summary with their personal selection of a "Link" and an "Most Important Point". These are respectively; the subject or topic, within their reading, which links that subject to the previous and/or future reading sections, and the most important idea or technical point in the reading. Each link and important-point requires a

few-word justification for their selection. The presenting Team may use their texts and they are asked to refer the audience Teams to important key figures, data, and equations in the text, as they are orally described.

As initially conceived, the "reward" (read, inducement) for what certainly would be extra work for all students, would be a good grade for this effort, and that this grade could be materially significant (>10%) to the student's final course grade. To assure that presentation grades would be "good" (not necessarily realistic), the grading assignment was delegated to the students themselves, and not to the Instructor. As a contingency against outrageous grade inflation, the Instructor, in his written description of the RS method, reserved the right of grade adjustment. A letter grade, with pluses & minuses, was used to grade the team's (not the individual's) RS performance, and the student audience recorded a single consensus grade from each of the audience teams. Also, the presenting team was permitted to grade their own performance. All team grades were recorded by a selected team member and given to the Instructor weekly.

Did the RS method work in practice? In the first Semester of using the RS method in the technical courses I taught, two interesting effects were observed after only a few weeks into the term. Like all experiments, there was good and bad news. The "good news" was that RS were working beyond expectations. The students were taking the RSs very seriously and, generally, doing an excellent job. Some groups were using prepared notes and were working in advance to polish their summaries, just in case "their ball" might be pulled. And everyone (no exceptions) was reading their assignments in advance of the lecture! Too good to be true? Yes and No. Yes, they were reading in advance and presenting very good summaries, but No, it wasn't all good. They were managing this miraculous transformation by giving their time, attention and thinking to RSs and not to their Team Homework assignments, as they usually did. The "bad news" was that their homework grades were plummeting. A course correction was necessary.

Reading Summary Variations

A method to persuade the Teams not to shortchange their standard homework assignments was not hard to find: Just an extension of the RS scheme. Problem Summaries (PS) were invented. A "Problem Summary" was an oral summary of one problem (selected by the Instructor) from among the problems due on the day of the lecture session. As with RSs, a team was selected at random, and all members must participate. Three areas had to be clearly, but briefly reported: A sketch of the problem, the basic principle &assumption of the problem, and orally, a brief description of the solution method and result. Again, student grading for PS's was to be based on coverage of these three areas, clarity, and correctness. To assure that reading and homework assignments had at least equal chance for student team attention, two chips, one marked PS and the other RS were added the ping-pong ball container. The random selection process, at the beginning of each lecture session, consisted of selecting one team identification ball and one Summary chip.

In the use of the RS/PS method over three years, a number of other variations have been introduced. Some of these changes were made to provide extra flexibility in the scheduling and teaching of the course material, while other variations where introduced to combat student's well known and highly developed skills in "beating the system". Let me discuss these changes by the Summary type, starting with Problem Summaries.

It quickly became apparent that the PSs were an excellent teaching tool for problem solving, and appropriate, therefore, to introduce into the schedule at a point that could not be programmed be the random chip selection method. This was solved by the Instructor simply stating, on any given day, that a PS would be presented. Since this, like the problem

selection, was not programmed or announced in advance, students still could not anticipate which problem was to be discussed, and what team would have to "Stand and Deliver". To take the maximum advantage of the PS, it was obvious that more than five to eight minutes of presentation time would be required. This was especially true after the Instructor started the practice, before he commented of the presenting team's solution, of asking the audience teams to comment and question the solution before them. If the presenting team's solution was "wrong", audience teams (even those that never asked the Instructor questions) would often ask if another approach (theirs) was also "correct". While the discussion proceeded, the Instructor would, when he felt appropriate, ask his own questions of all Teams. These interactions, largely between students, but always finished with the Instructor's clarification, could take much more time than the usual RS. The richness of the learning experience, It was concluded, more than compensated for the loss of Instructor lecture time. Management of the frequency of the RS – PS mix, and even, when necessary, dropping (but never by prior notice) a Summary session (almost always a RS), became a useful technique to assure schedule and topic coverage.

Student skills at "working" the RS/PS method also, as always, quickly developed. This was particularly true for Reading Summaries, where individuals learned to pre-select and read only the sections of the reading assignment they would have to present, if chosen. In this way, individual students could reduce the reading assignment by about two-thirds in a three member Team. The Instructor, to counter this practice, was to, on randomly chosen days, randomly select which individual members of the "Selected Team" was to present the first, second, etc., portions of the assigned reading. An other technique that students developed when they had not read the text assignment, was to read the text's sections headings and equations, glibly filling in the gaps with smooth bridging language. Mercer students are required to do so many oral presentations throughout their undergraduate years, that a good number, particularly in their Senior year and in their third course where RS/PS methods were used, could "fake it all the way", with remarkable aplomb and articulateness. I have found no counter to this student skill (skill?).

The last modification to the basic RS/PS model involves grade inflation. Not unexpectedly, from the earliest course trials, there occurred some modest student inflation of team presentation grades. Despite frequent Instructor scolds, the practice continued. It was felt, however, that some grade inflation (read, mutual self-assigned reward) to be justified. After all, weren't they being asked to do a lot more work, with the RS/PS method, than was usual? Finally, however, with a Senior course, because of, I suspect, class familiarity, and perhaps an unspoken (spoken?) agreement for reciprocity, the presentation grades became outrageously high. The solution to this problem came from my recognition that it didn't cost anything for a team to give a very high grade. Their extravagant grade generosity came from the Instructors grades, not from the team's pockets (their own grades). From here the solution was clear. I explained that their current practice of extremely high grade inflation was perfectly OK, but hence forth, they had to be generous with their own money (read, grades). If any team's grade (for themselves, or other team's) was more than a "nominally inflated grade", the inflated portion would come from that team's grade pool. They could be as generous as they wanted to be, but they had to pay for it themselves, not with the Instructor's money. I entertained no requests for a definition of "nominally inflated". Although resisted and resented, all student grade inflation, I mean all (some C's even began to appear), ceased immediately. This confirmed what we all know: Grades are a powerful (the only?) motivator!

Assesment

As with all non-traditional instructional methods I have tried, the Reading Summary method was evaluated by each individual student, via a written form, at the end of the semester's

course. This practice was initiated at the first trial course and has been continued with all subsequent courses. The questions, which can be seen in Figure 1, focuses on the areas of the course for which the RS/PS assignments might or might not have helped the student, the grading system, the most positive & negative aspects of the method, and whether the student recommends that the method be continued in future presentations of the course.

The RS/PS method has been used for three continuous academic years; 1998-99 through 2000-01, in all the author's classes. These courses, which include technical and non-technical material, were presented at every academic level of the undergraduate engineering program at Mercer. The specific identity of these courses are given, by program year, in Table 1 below.

Table 1

Year	Course #	Course Title
Freshman	EGR 107	Introduction to Engineering Design
Sophomore	BME 287	Introduction to Biomedical Engineering
Junior	BME 460	Biomaterials
	EVE 460	Introduction to Environmental Law
Senior	BME 412	Orthopedic Biomechanics
	BME 435	Biothermodynamics & Heat Transfer
	BME 426	Diagnostic Imaging
	BME 425	Basic Transport Phenomena

Findings

The outcome of this RS/PS experiment was assessed from two perspectives: Those of the students, and those of the Instructor. This Section will present a summary of each of these in order.

Student Responses

Tabulation of all the end-course, assessment questionnaires (Table 2), for the courses of Table 1 gave a clear, and unambiguous message of how the students felt about the Reading Summary and Problem Summary method. The simplest way to summarize this overall reaction is give the responses to Evaluation Point #3: "Give your most important observations and conclusions about the RS/PSs". Table3 shows the most frequently expressed responses to this request. Only those responses that appeared in four percent or more of the individual questionnaires are included. The percent of total questionnaires in which the response appeared is also given.

EVALUATION
TEAM READING/PROBLEM SUMMARY CONCEPT

Using the same grading scale as for the previous HT evaluation, answer the following questions with regard to the Team Reading/Problem Summaries (TR/PSs) used in this course.

1. Rate your feelings about the degree of help the (TR/PSs) provided for the following:

Area	Rating	Reason
Previewing the Lecture	_____	_____
Material Understanding	_____	_____
Exam Preparation	_____	_____
Seeing Science Connections	_____	_____
Finding Important Concepts	_____	_____
Homework Assignments	_____	_____
Design Problem	_____	_____
Making Technical Decisions	_____	_____
Overall Rating	_____	_____

Rating Scale
0 = Of no usefulness or help
1 = Of only small usefulness of help
2 = Of fair usefulness of help
3 = Of good usefulness of help
4 = Of excellent usefulness of help

2. Was the grading system for the RS/PSs fair and reasonable?
Yes _____ No _____ Comments & Recommendations _____
_____
_____

3. Your most important observations and conclusions about the RS/PSs.
Positive: Area _____
Reason _____

Negative: Area _____
Reason _____

4. Would your recommend continuation of these RS/PSs
Yes _____ Why?_____
_____

No _____ Why?_____
_____

Recommended Changes? _____
_____

Table 2
Student's RS/PS Evaluation Form

Table 3.
"Most Important Observation and Conclusion about the RS/PS Method"

	Response	Percent of Total Questionnaires
Positive	Made you read the assignment	36%
	Prepared you for the lecture	23%
	Helped you learn the material	13%
Negative	Reading the assignment took to much time	17%
	Presenters just read from the book	9%
	I couldn't understand the reading in the book	5%

The magnitude of the above percentages, and their difference, are significant. About 20% of the questionnaires had no "negative" responses, which is very uncharacteristic for Mercer students.

Evaluation Point #1 mirrored Table 2's findings in that "Previewing the Lecture" and "Material Understanding" were the dominate high scorers, although it was a pleasant surprise to find five to ten percent of responders giving "high scores" to "Finding Important Concepts" and even "Making Technical Decisions" . High or Low scores were defined as scores that were one or two scores points above (or below) the question's "Overall Rating" score, for which the average of all respondents was 2.30.

The student Grading System feedback for Evaluation Point #2 was, without a single exception, considered fair and reasonable. This 100%, uniform conclusion, however, was the response for only the first seven courses, given in the first two years of the RS/PS experiment, during which no restraints (student of other) existed to check student grade inflation. After the abuse of this privilege was brought to an end by the "charity starts at home" method described above, fifty to sixty percent of the classes rated the grading system (read, inflation constraints) as not fair and reasonable. Apparently, greatly exaggerated grades by students are considered, by them, as fair and reasonable, where as, any means to moderate that instinct is considered, again by many of the students, as unfair and unreasonable. Is there an interesting ethical issue here?

Evaluation Point #4 was positioned and phrased to bring out the best, most considered judgement and recommendations in the student responder; and I believe that it did. The question "Would you recommend continuation of the RS/PS method?" elicited an extremely positive response. Averaged over all the courses of the three year experiment, more than 87% of the students responded yes. They gave, for the reason for this conclusion, uniformly the same answer as they had singled out as the most important positive observation they recorded for Evaluation Point #3, (Consistency, at last) . An additional interesting indicator of student positive overall feeling for the method, was the general lack of responses (<5%) to the "Recommended Changes" question. However, those which were offered, were done so, with a few exceptions, in a serious construction manner, several of which have been integrated into the RS/PS method.

Instructor Conclusions

From the point of view of this Instructor, the RS/PS experiment has been a success. While I do not consider "student approval" as the chief arbiter of "success", it shouldn't be overlook. In the case of Reading/Problem Summaries, an 87% recommendation-for-continuance may be as high as anything I do in the classroom. A more significant indication occurs, I believe, when the students tells me that the method helps them "learn", "understand" , "find the important point", and, while only occasionally, "make better technical decisions".

An important, additional student improvement comes, with the method, in the area of oral "stand and delivery" skills. While the RS/PS method can not claim all the credit at Mercer, the growth of student verbal summarization and presentation capabilities has been remarkable in the student's passage from the first to the third course that uses the RS/PS practice. In the case of those few extremely shy students, or those with mild speech defects, the method, including the teaming aspects, appears to make a major contribution to their improved skills level and personal confidence.

Positive and beneficial as these outcomes are, it should be pointed out that they are secondary, you might say, unintended objectives. Recall that the reason this scheme came into being was to create an incentive or reward for the student to read the text assignment before the lecture and homework. To this end, the Reading/Problem method works without doubt! And it worked for all students, weak and strong. The author has no delusions that the technique changes, in a major way, the habits of the best students: It does not. They would read the text any way, although perhaps not prior to the lecture. The average and weaker student, however -almost without exception, will change their reading habits. Their motivation, I believe, is not the grade (although they will take it) , but the strong desire to avoid giving a poor or incompetent presentation (read, peer pressure). I have observed, in this group of students, the RS/PS method has made a major difference in their approach to the material, which is a substantial recommendation for the technique.

And there's more to be mined from the method. Within the last year, growing experience and student questionnaires, clearly indicate the greater potential of the Problem Summary portion of the method. Students (and this Instructor) sense that they learn a great deal about problem identification, structuring and solution from the format of the PS method. Additionally, the team's (presenter and audience) interaction, together with the Instructor's, can deepen the learning experience in a meaningful way. While lecture-time consuming, an expanded PS method can make a future major improvement, I believe, in the problem-solving skills of students taking technical, problem centered courses.

While the test of three years experience has caused the RS/PS method to evolve a number of more complex variations, such as student grading and grade-inflation methods, Problem Summaries etc., the largest benefits of the method comes, it is believed, from the simple core of the technique. Rewarding students (or helping them avoid embarrassment) for reading the text assignment prior to class by randomly selecting them to make a brief oral presentation, can be used in a simple way with almost any lecture course.

References

Felder, Richard M. and Rebecca Brent (1994) "Cooperative Learning in Technical Courses: Procedures, Pitfalls, and Payoffs" ERIC Document 377038