The use of the IF-AT (Immediate Feedback Assessment Technique) for exam preparation in undergraduate biology courses

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Abstract

This poster presents the IF-AT (Immediate Feedback Assessment Technique) as a valuable tool for reviewing material prior to a classroom examination in human anatomy, physiology, and cell biology courses. The IF-AT is a multiple choice procedure that provides immediate informational feedback to students for each question during the examination and allows the instructor to allot partial credit (1). The IF-AT sheet is a combination of a Scantron© with a scratch-off lottery ticket. The student scratches off a letter (A to E) to correspond with his or her answer choice. A star in the box signals that the student is correct. If incorrect, the student chooses a second, third, or fourth box to scratch. The instructor then grades the sheet and gives partial credit for a second or third-choice. While this system has been implemented in courses at all learning levels from grade school to college, this poster presents information showing the use of this tool for active group learning in biology classes ranging in size from 11 to 51 students. Students are placed in groups of four and given the IF-AT answer sheet, a score card, and review questions. Then, before the activity begins, each student is given the job of moderator, reader, scribe (aka scratchmeister), or tabulator. The students first answer questions individually. Once each student has completed the questions, the answers are discussed in the group and the best answer is chosen. The corresponding block on the IFAT sheet is scratched off to reveal if the answer is correct. If the answer is incorrect, students continue to choose answers. Each attempt results in fewer allotted points and augments learning through immediate feedback. Students tally final totals and teams post their scores at the front of the classroom.

The tool is effective at qualitatively assessing the pre-examination abilities of students to comprehend the material. It also helps individual students realize his or her understanding of the material in comparison to other students. Through this activity, students are focused on the important concepts to review for the exam which will occur during the next class period. As each student is assigned a specific task, this procedure also involves all students in the group process. For the instructor, the procedure helps to distinguishes when the student grasps some of the class material as opposed to a complete lack of understanding.

Results from this classroom procedure are qualitative. The author brings this information to the conference with a desire to discuss options for quantifying student learning with colleagues.

Introduction

I often hold review session before exams. I have tried a variety of methods to engage my students and find the IF-AT tool to be an excellent resource. I have used it in small classrooms (11 total students) and medium-sized lecture halls (35 to 51 total students). Additional sources have used IF-AT in classes of 130 students (2) and also found the students to be engaged in the learning process. By breaking the students into small groups, this enables active learning in such large lecture sections.

The IF-AT helps the student gauge his or her understanding on the material that will be on the approaching exam. This allows the student to quickly evaluate areas where he or she should focus during studying. Additionally, the immediate feedback of the learning tool enables the student to actively learn during the review process. Lastly, the student enjoys working with others in a group with limited social pressure if his or her answer is incorrect.

While some faculty use the IF-AT for test-taking and grade assignment, I use this tool only for personal assessment by the student. However, I do award participation points as well as prizes for the "winning" teams.

Procedure

From 2007-2009, this active group learning tool was used in biology classes ranging in size from 11 to 51 students. Students were placed in groups of four and given the IF-AT answer sheet, a score card, and review questions (Figure 1). In smaller classes, or in case of odd numbers, groups of three were used in addition to groups of four. Groups were assigned by the instructor and arranged prior to the class period. A number or criteria went into arranging groups, including separating friends & lab partners into different groups.

Before the activity began, each group designated students with one off four jobs:

- **Moderator:** **Focused student discussion and summarized findings**
- **Reader:** **Read the question and options**
- **Scribe:** **(aka Scratchmeister) Revealed answer square with a coin**
- **Tabulator:** **Kept track of the team score**

The students first answered questions individually. This took approximately fifteen minutes. Once every student in the group has completed the questions, the answer to each question was then discussed one at a time. The group came to a consensus and the best answer was chosen. The corresponding block on the IF-AT sheet was scratched off to reveal the presence or absence of a star (Figure 3). If the answer was correct, the students saw a star somewhere within the box. Its exact location within the box has been randomized to prevent "peaking", partial scratching of an answer. If the answer was incorrect, students continued to discuss the remaining answers. The next choice was then scratched off. This continued until the correct answer was located on the IF-AT sheet. The score was then recorded on the score card (Figure 2).

Each attempt resulted in fewer allotted points. If the students answered correctly on the first attempt, ten points was allotted. A correct second attempt earned five points, 2 points for a third try, and one point was awarded for a fourth try. No points are allotted on the fifth try because the correct answer is the only remaining box available.

Students tallied final totals and teams posted their scores at the front of the classroom under the team name. The teams with the top three scores received prizes ranging from candy bars to highlighters and pencils. The only grade given to the students was an all-or-none participation grade.

The IF-AT provides immediate feedback to students during the reviewing process. The review questions were then taken out of the classroom by the students and used as a study tool for the exam.

Notes:

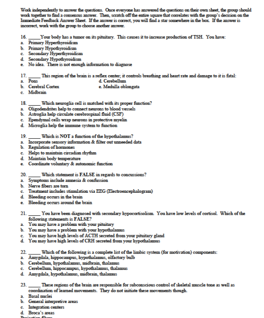
Because groups worked at their own pace, some groups finish earlier & had to wait quietly for all groups to finish. This did not cause a problem as students either socialized quietly or reviewed by themselves. When one or two (out of 10) slower groups occur, the instructor prodded them to finish up. Often those groups were dwelling on one of the last questions.

These multiple choice questions are more challenging than average test questions in order to encourage student discussion.

The IF-AT answer sheets are recycle and uses during three different class periods.

Only participation points are given. No points are given that correspond to the score to prevent penalizing students. The engagement of students and the possibility of prizes seems to be enough motivation for the students.

Figure 1. Example of Questions from an Anatomy & Physiology Course



Work independently to answer the questions. Once everyone has answered the questions on their own sheet, the group should work together to find a consensus answer. Then, scratch off the entire square that correlates with the group's decision on the Immediate Feedback Answer Sheet. If the answer is correct, you will find a star somewhere in the box. If the answer is incorrect, work with the group to choose another answer.

16. _____Your body has a tumor on its pituitary. This causes it to increase production of TSH. You have:
a. Primary Hyperthyroidism
b. Primary Hypothyroidism
c. Secondary Hyperthyroidism
d. Secondary Hypothyroidism
e. No idea. There is not enough information to diagnose

17. _____ This region of the brain is a reflex center; it controls breathing and heart rate and damage to it is fatal:
a. Pons d. Cerebellum
b. Cerebral Cortex e. Medulla oblongata
c. Midbrain

18. _____ Which neuroglia cell is matched with its proper function?
a. Oligodendrites help to connect neurons to blood vessels
b. Astroglia help circulate cerebrospinal fluid (CSF)
c. Ependymal cells wrap neurons in protective myelin
d. Microglia help the immune system to function

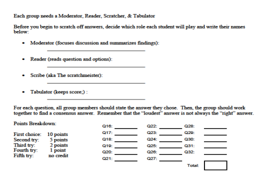
19. _____ Which is NOT a function of the hypothalamus?
a. Incorporate sensory information & filter out unneeded data
b. Regulation of hormones
c. Helps to maintain circadian rhythm
d. Maintain body temperature
e. Coordinate voluntary & autonomic function

20. _____ Which statement is FALSE in regards to concussions?
a. Symptoms include amnesia & confussion
b. Nerve fibers are torn
c. Treatment includes stimulation via EEG (Electroencephalogram)
d. Bleeding occurs in the brain
e. Bleeding occurs around the brain

21. _____ You have been diagnosed with secondary hypocortisolism. You have low levels of cortisol. Which of the following statements is FALSE?
a. You may have a problem with your pituitary
b. You may have a problem with your hypothalamus
c. You may have high levels of ACTH secreted from your pituitary gland
d. You may have high levels of CRH secreted from your hypothalamus

22. _____ Which of the following is a complete list of the limbic system (for motivation) components:
a. Amygdala, hippocampus, hypothalamus, olfactory bulb
b. Cerebellum, hypothalamus, midbrain, thalamus
c. Cerebellum, hippocampus, hypothalamus, thalamus
d. Amygdala, hypothalamus, midbrain, thalamus

23. _____ These regions of the brain are responsible for subconscious control of skeletal muscle tone as well as coordination of learned movements. They do not initiate these movements though.
a. Basal nuclei
b. General interpretive areas
c. Integration centers
d. Broca's areas
Projection fibers



Each group needs a Moderator, Reader, Scratcher, & Tabulator

Before you begin to scratch off answers, decide which role each student will play and write their names below:

- Moderator (focuses discussion and summarizes findings):
- Reader (reads question and options):
- Scribe (aka The scratchmeister):
- Tabulator (keeps score;) :

For each question, all group members should state the answer they chose. Then, the group should work together to find a consensus answer. Remember that the "loudest" answer is not always the "right" answer.

Points Breakdown:

First choice:	10 points
Second try:	5 points
Third try:	2 points
Fourth try:	1 point
Fifth try:	no credit

Q16: Q17: Q18: Q19: Q20: Q21: Q22: Q23: Q24: Q25: Q26: Q27: Q28: Q29: Q30: Q31: Q32:

Total:

Figure 2. Score Card with Instructors to Students

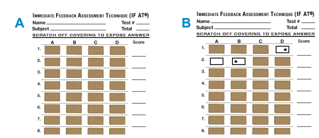


Figure 3. IF-AT Answer Sheet

(A) Card before it is used. (B) Card in use. Students have selected the correct answer for question 1. The students required two attempts to find the correct answer for question 2. Photo from Epstein (1)

Results & Discussion

Subjective Results:

1.Students enjoy attending at least one 8AM lecture during the semester.

2.Students are actively engaged during the duration of the activity.

3.When studying for the exam, students can focus attention to certain areas of the material they struggled with during the activity.

4.Students have a handy "study guide" & don't bug the instructor for another one.

5.Instructor can quickly skim the score cards (or IF-AT answer sheets) to see which questions/areas students struggled with during the review

6.Instructor can assign participation credit to all students which can be very helpful to struggling students

Discussion:

This is where you can help me! I'd love to find a way to quantify student learning with this technique. Suggestions, comments, & questions are welcome. Do you have a classroom in which you'd also like to use the IF-AT? Are you interested in developing a collaboration & objective way to evaluate student learning? Please contact me!

Conclusions and Future Work

I enjoy using this tool in my classroom. It allows me to see the students actively learning & working in groups. It is very exciting as an instructor to hear a group "hooray" or high-five because they figured out the right answer. I also know the students enjoy the review & find it helpful for the exams. While I do not use this technique for every review day, it is simple to use & effective. I certainly recommend you give it a try. Please feel free to contact me with questions or for help.

I hope to quantify the usefulness of the IF-AT in my classroom. Any suggestions on techniques, resources, or ideas are greatly appreciated.

References

1) **Epstein Educational Enterprises** Available 2009-03-01 http://www.epsteineducation.com/

2) **Piascik, Mary. and Bird, Eleanora. "Application of the Immediate Feedback Assessment Technique (IF-AT) for Group Learning in a Therapeutics Course"** *Paper presented at the annual meeting of the American Association of Colleges of Pharmacy, Disney's Yacht & Beach Club Resort, Lake Buena Vista, Florida*, Jul 14, 2007 Available 2009-03-01 http://www.allacademic.com/meta/p195931_index.html

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