
Vernon Williams
*University of Nebraska-Lincoln*

Robert Fuller
*University of Nebraska-Lincoln*, rfuller@neb.rr.com

David Joseph
*University of Nebraska-Lincoln*

Follow this and additional works at: [https://digitalcommons.unl.edu/physicspsikeller](https://digitalcommons.unl.edu/physicspsikeller)

Part of the Physics Commons


[https://digitalcommons.unl.edu/physicspsikeller/5](https://digitalcommons.unl.edu/physicspsikeller/5)

This Article is brought to you for free and open access by the Instructional Materials in Physics and Astronomy at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Personalized System of Instruction (PSI), or Keller Plan, Materials by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
While the elements vary somewhat from list to list, most authors agree that the five points presented here constitute the essential aspects of PSI. Even wider variation exists among lists of learning principles prepared by various psychologists. While some arbitrariness is inevitable, the principles offered in support of each element of the PSI approach were chosen in an attempt to represent at least a modicum of consensus among psychologists concerning the way humans learn. These principles are offered here primarily as a means of showing how the Keller Plan incorporates some of the basic concepts of learning:

1. PSI is self- (individually) paced.
   a. Sharing with the student responsibility of learning increases his involvement in the learning process. The student rather clearly has a large part of the responsibility for learning in PSI; if he does not complete a unit, the course does not move ahead automatically as is the case in the traditional approach.
   b. The more similar the learning situation to the one in which the learning is to be used, the more likely the student is to transfer his learning from the former to the latter. The self-paced, individually initiated PSI course seems to resemble more closely the situations an adult will typically encounter than does the traditional lecture course.
   c. Learning progresses more rapidly when up to eighty percent of the learner's time is spent reciting what he has read or heard. The self-paced features, as well as others in PSI, place emphasis on the learner's demonstrating his skill/knowledge rather than on his passively assimilating information.

2. The student is expected to master 100% of the content on the examination signalling completion of each unit. To facilitate learning maximally, rewards should be presented in a variety of forms. One of the most important of those forms seems to be the sense of satisfaction achieved by mastering a task or problem. This element of PSI rather clearly incorporates the sense of mastery.

3. Lectures and other techniques are used as vehicles of motivation rather than as sources of critical information.
   a. Rewards are most effective when they follow directly the action(s) they are meant to reinforce. Lectures and other devices recognizing student achievement are employed after the student has completed one or more units. The fourth element, involving use of the tutor, also incorporates this principle of immediate reward.
b. Learners should be able to discriminate one sort of a learning task from others they encounter. This use of lectures, the self-paced quality, and other features distinguish PSI rather clearly from other learning situations the student is likely to experience.

4. Proctors, usually consisting of students who have recently completed the course units in a highly adequate fashion, are used, making possible multiple testing opportunities, testing on demand, tutoring, and personal interaction with students.

a. Feedback, or the knowledge of results of one's performance, is an essential ingredient in the learning process. The proctor makes frequent feedback feasible.

b. Behavior that is punished tends to be avoided. PSI focuses on the positive aspects of the student's behavior rather than its negative aspects, thus avoiding the deleterious effects of punishment.

5. In PSI, stress is placed on the written word.

a. Establishment with the individual of objectives for his learning can facilitate his learning.

b. Both recall of learning and insight into new ideas are facilitated by organization of facts and concepts within the larger framework.

The explicit presentation in writing of the material to be learned in unit form provides a coherent organizational scheme in which to place one's learning.

c. Again in this feature, as well as in the first one, the similarity to the most typical adult learning situation increases the likelihood that the learning habit will be continued in adult life. Since most adult learning centers on the written word, PSI should enhance the transfer.

PSI INSTRUCTIONAL TASKS

If you are interested in teaching a course using the Personalized System of Instruction, you need to give thought to at least three instructional tasks: development of the course content, devising a course policy, and formulating a strategy for managing the course.

The development of your course content may be facilitated if you look at what the other people have done in your academic discipline or any related content areas. Both the Proceedings of the Rice Conference and the PSI Newsletter are good sources of such information.

Most PSI courses use some form of written study guides. If you have not had experience in writing study guides you will find a booklet by Walbesser, et al. of some interest or perhaps the article by Speeth & Marquilles on "Techniques for Maintaining Student Motivation".

Of course, you could hardly go wrong if you follow the prescription, prescribed by Dr. Keller as follows:

"The first thing to do is to break down your course material into the study units. Twenty to thirty, in a three-hour course, is my suggestion; but there's getting to be a lot of talk about the number of units, and I guess it depends on so many things that it better not stress that. It should include, however, three or four units of a review. That is to avoid undue fragmentation of the course and to consolidate what the student has learned.

Secondly, add to each unit a set of study questions and objectives and make up three or four equivalent tests to cover the same material.

Thirdly, put each student through the unit at his own pace, testing him as many times as needed, without penalty for failing, until each unit is
Personalized System of Instruction

mastered to perfection. I know perfection is a word that should be in quota-
tions, but we know roughly what I mean.

Fourthly, throw in a few lectures or demonstrations during the new term for 
seasoning. But don't require your students to attend them. Their aim is to 
inspire, not to be remedial or to inform, and if you overdo the lecturing, you're 
taking the students away from things that would be more productive.

Fifthly, use well-prepared and carefully guided student proctors to grade the unit tests. One proctor to each ten students is about the right proportion.

Add a final examination, if you wish, when the units have all been completed. It may make your course smell better to your colleagues, and it may fortify the product. Give an "A" to everyone who completes the course requirements, early or late—roughly as you would award a Ph.D. Be generous with your Incompletes, but it is possible that you may want to stir things up a bit, if you see too much procrastination taking place. And, finally, watch carefully, while cooking.

In devising the policies for your course, you must deal with such things as how you will determine grades, how you will obtain proctors and, too, what rewards you will have for them, how you will deal with the procrastination problem, whether or not you will give incompletes, and what hours the proctors will be available. Many varieties of course policies have been used in various PSI courses, and many of them seem to work, as long as you are careful not to subvert the learning principles as previously discussed. Examples of the policies followed are found in Keller's original article, in an article by Ben A. Green, Jr., and in the very complete instructor manual prepared by David Born.

The nitty-gritty details of course management must be treated with respect. Several otherwise good PSI courses have failed because students had to wait too long to see their proctors, or the security system for protecting the examinations from public exposure broke down. So you must formulate a strategy to keep track of what each student is doing as well as a system that allows the student to always know where he is along the way. You need to have a system of keeping the tests under some form of security and to be able to analyze them at the end of the course so that the next time you can improve your system.

You also need to schedule times when you and the proctors are together to deal with any problem that has arisen in the course and so that you can stress the important concepts in the course content.

How do you intend to communicate information to the students in your course now that you probably will never see all of them together at one time? Several of us have found a Keller Plan bulletin board an essential feature of our course. You also need to give some thought to the physical setting for your PSI course. Two standard size classrooms, close together, work quite well, one for test-taking and quiet study, the other for test grading and tutoring.

Finally, the whole PSI classroom atmosphere can be used to reflect your personality. In one PSI physics course here the joy of mastering a unit not only brings handshakes and smiles from the staff but also gold stars to stick on the progress chart and a big piece of bubble gum.

MAKING YOUR PSI COURSE A SUCCESS

Because the instructional tasks involved in PSI are quite different from those of the lecture method, you will
need to be resourceful to make it succeed on your first attempt. While PSI has produced sufficiently consistent results to assure many observers that it can be superior to more typical lecture courses, several factors difficult to control may contribute to the failure of any particular PSI effort. Some of these factors are: an instructor's lack of familiarity with the method; inadequate advanced planning so that a student does not know what to expect; unclear instructions to students; insufficient or faulty examination questions; inordinately large and difficult units. It is probably unusual if at least one of these factors is not operating the first time one does use PSI. However, by your own understanding of the essential features of PSI, and by appropriate use of student feedback as you manage your PSI course, you can turn early indications of potential failure into success.

The following sources are recommended for help in making your course a success:

A. General References
1. The Center for Personalized Instruction (footnote giving address) (including Keller, Sherman, Green, and R. S. Ruskin) offers help in various ways: conferences, workshops, consultants, literature, films, and the PSI Newsletter.
4. Proceedings of the Keller Method Workshop Conference, Rice University, Houston, Texas. These contain talks by Keller, Sherman, Green, Leidecker, Backer, and Howell, and summaries of 22 courses.

B. Instructional Resources
1. "Personalized System of Instruction: An Alternative," 14 minute, b&w, 16mm film that introduces the concepts of PSI and shows some PSI classroom scenes.
2. "PSI," 30 minute, b&w videotape featuring Professor Sherman. He gives the history and the rationale of PSI and shows some classroom activities.
3. "Instructor's Manual" and "Proctor's Manual." Professor David Born. A most complete discussion of all that is involved in the daily activities of teaching and managing PSI courses. The appendices I and J give evaluation data for Born's PSI courses.

C. Resource Persons
Nearly all the individuals who have used and written articles about PSI are willing to explain their system to others. The Center for Personalized Instruction collecting information about those who are using PSI. They may be able to furnish you with the names of persons in your area who are experienced in the use of PSI.

Numerous questions almost inevitably arise in the process of establishing and conducting a PSI course for the first time. It might be helpful to have someone visit and explore some of your questions with you at some time prior to or after the initiation of a PSI course.

Dr. Robert Fuller employs the Personalized System of Instruction approach in his Department of Physics, University of Nebraska-Lincoln. We invite you to observe Fuller's model and to meet Professor J. G. Sherman, in a 13-minute film entitled "Personalized System of Instruction: An Alternative." Sale prints are available for $82.50 or preview rental prints for $8.50 (1-5 days). Write:

University of Nebraska-Lincoln
Instructional Media Center
University of Nebraska Extension Division
Lincoln, Nebraska 68508

Dr. Fuller explains the elements of PSI to a University of Nebraska physics class. (A scene from the 16mm film "Personalized System of Instruction: An Alternative.")
THE SELLING OF PSI

Since PSI involves a break with a tradition, some means should be developed to explain it to colleagues. Ones colleagues are inclined to watch an innovation with some degree of skepticism just because the approach is different from the traditional one. This skepticism may make it difficult for colleagues to accept your success story. A good approach to this situation seems to be to combine two techniques: you should be able to supply information about the colleges that already use PSI, and you should be able to discuss the evaluation of PSI.

PSI courses typically have been evaluated in several ways:

1. The distribution of course grades is compared with the distribution in the same course that is taught traditionally. (5, 7) The typical PSI grade distribution includes about 50% A's, a large number of incompletes and small numbers of F's, D's and C's.

2. The performance of students in the PSI course is compared with the students in the traditionally taught course on a common examination. (5, 7, 11)

3. The students' own evaluations of the course are obtained. (6, 7, 11) The performance of PSI versus traditional students is examined in further course work in the same field.

The most nearly adequate evaluation of course, would entail all of the information listed in the above points plus others. One of the obvious difficulties in obtaining methodologically sound data on which to base an evaluation of PSI has to do with the odds against getting two classes in which the students and the conditions are comparable enough to permit a sound comparison. This difficulty has not stopped instructors from trying to get whatever information is available concerning the performance of PSI students and to compare the information with data as gathered from more traditional courses. Nor should the difficulties prevent the effort, in our view, to approximate as nearly as possible in real life the ideal sort of evaluation one might like to see done with PSI. Speaking of the ideal, though, we might mention some other indices one might like to include in examination of the question of whether or not PSI is superior to other approaches. It would seem desirable to know whether students do take further courses in the same discipline, as well as further courses designated as PSI courses, to compare the actual accomplishment of a more specific learning objective (both in the eyes of the students and in terms of some sorts of achievement tests), and to sample students' attitudes toward further learning in general.

SHOULD YOU USE PSI?

Although PSI has met with a number of successes, it is not heralded as the answer to all of education's ills, nor even as a panacea for any teaching problems. Those who have tried it and like it may not be reliable witnesses. Professor Green, a PSI advocate, has written with tongue-in-cheek a list of objections to PSI: "You should not use the Keller Plan if: 1. Mastery is not the object of your course. 2. There is no adequate text for your course. 3. Your subject changes too fast. 4. You have 500 students with no help and no time off to prepare material. 5. Your students can't read, at least not well enough to do without the lectures. 6. You are legislatively required to lecture for a large number of hours. 7. You don't have the energy to try something new at the time. 8. Good teaching isn't rewarded at your school. 9. You can't get undergraduate tutors for love, credit, or any money. 10. One undergraduate cannot judge proficiency in your subject on the part of another undergraduate. 11. Your administration will not tolerate the larger fraction of A's. 12. You
object, in principle, to specify detailed objectives in your course.
are too soft-hearted to withhold privileges from a student who has not earned it. 15. You are satisfied with your present methods."

As Individual as a Fingerprint

BIBLIOGRAPHY

1. Proceedings of the Keller Method Workshop Conference. Available from
   Dr. A. J. Dressler, Space Science Center, Rice University,
   Houston, Texas 77001. $1.35 (Payable to Rice University).

2. PSI Newsletter. Center for Personalized Instruction, Georgetown
   University, Washington, D.C. 20007. $3.00 per year.
   Back issues (1-11), $4.00.

3. Walbesser, H.H., et. al. Constructing Instruction Based on Behavioral
   from Engineering Publication, Division of Engineering,
   Oklahoma State University, Stillwater 74074. $3.00.


   1, 78. 1968.

6. Green, B. A., Jr. "Physics Teaching by the Keller Plan at MIT."

   Instruction Course (165p.) and Proctor Manual (44p.)
   Available from College Book Store, 200 University Street,
   Salt Lake City, Utah 84112. $6.25 & $2.25.

8. Memo to the Faculty, #48. Center for Research on Learning and Teaching,
   109 East Madison Street, Ann Arbor, Michigan 48104.
   Single copy $.25.

   Media Center, University of Nebraska-Lincoln 68508.
   $8.50. Rental.

10. PSI. NETCHE Library, P. O. Box 83111, Lincoln, Nebraska 68501.
    One-inch or one-half-inch videotape. $20.00 Rental.

11. Petr, J. "Experimental Use of 'PSI' or the 'Keller Plan' in Principles
    of Economics." Department of Economics, University of
    Nebraska-Lincoln, Lincoln 68508.

12. Austin, S.M. and Gilbert, K.E., "Student Performance in a Keller-Plan
    Course in Introductory Electricity and Magnetism,"