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Abstract
In "natural learning" the learner takes responsibility for learning. This responsibility applies to setting objectives, selecting active learning tasks, obtaining feedback, and making applications. Self-oriented skill training (SOS) provides a highly structured procedure to help the learner through the above four phases of natural learning. Of particular importance in SOS is the experiential exercise; this can put the learner through the unfreezing, change, and refreezing steps. The design of SOS is based on substantial empirical evidence. Results from five crude field experiments were consistent with the hypothesis that SOS increases the efficiency of learning. In a 6-month follow-up, participants using SOS reported 2.1 behavioral changes vs. 0.6 for those following a traditional approach to learning.

Comments
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The Natural Learning Project*

J. Scott Armstrong

In "natural learning" the learner takes responsibility for learning. This responsibility applies to setting objectives, selecting active learning tasks, obtaining feedback, and making applications. Self-oriented skill training (SOS) provides a highly structured procedure to help the learner through the above four phases of natural learning. Of particular importance in SOS is the experiential exercise; this can put the learner through the unfreezing, change, and refreezing steps. The design of SOS is based on substantial empirical evidence. Results from five crude field experiments were consistent with the hypothesis that SOS increases the efficiency of learning. In a 6-month follow-up, participants using SOS reported 2.1 behavioral changes vs. 0.6 for those following a traditional approach to learning.

Experiential exercises seem to offer substantial opportunities for learning. However, we have found little evidence that learning is more likely to occur with experiential exercises than with competitive methods such as lectures. This paper suggests that the success of experiential exercises depends upon the overall learning environment. Little benefit is expected if experiential exercises are adopted within the traditional environment, where the teacher accepts responsibility for learning; however, in situations where the learner takes responsibility, experiential exercises are expected to be of substantial value.

This paper discusses a strategy for helping learners to take responsibility. We have redesigned the educational system using the principles of natural learning. A brief description of natural learning is provided along with a highly structured approach for its implementation. We call this highly structured approach SOS, for self-oriented-skill training. The SOS technique has been used in five field experiments: a brief summary of the results is also presented.

Our research is neither complete nor conclusive. But it is promising. The objectives for this paper are to (1) find other teachers who are willing to experiment with natural learning (or who may have done so already) and (2) obtain criticism of our research.

Principles of Natural Learning

Natural learning has been used successfully by all of us. We used it when we learned such basic skills as speaking our native language and walking. The most important aspect of this learning was that each of us took responsibility. No teacher was needed.

Learner responsibility is required during each of the four phases of natural learning:

1. setting objectives,
2. finding and engaging in active learning tasks,
3. obtaining feedback on performance, and
4. applying what was learned.

The environment forces these steps upon the learner for such basic skills as walking or talking.

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In adult education, the environment seldom provides the conditions for natural learning. We hypothesize that people can improve their effectiveness at learning if they can redesign their environment to provide these conditions. Furthermore, we feel that educational institutions can play an important role in helping learners to create a natural learning environment. To this end, we have developed the highly structured SOS procedure.

SOS Training:

This section describes the structure of SOS for each of the four phases of learning. The empirical literature relevant to each of these four phases has been summarized in [1].

Setting Objectives

Students in a formal program of education are seldom expected to have explicit objectives. Moreover, they generally feel helpless about defining their own goals. Most students will claim that they do not have enough knowledge to set their goals. The first step, then, is to help participants to regain responsibility for setting objectives.

Under the SOS procedure, completion of a course is defined in terms of the learning process rather than in terms of performance on tasks. A deadline is set early in the course for participants to submit written statements of their personal learning objectives. These objectives must be stated so that success can be measured. The faculty member makes no evaluation of the quality of the objectives; it is only necessary that the statement meet the participant's standards for quality and that it be completed by the given date.

The teacher, or "facilitator," provides feedback to the learner on how well the learner is able to use the SOS process. He can also help by suggesting possible objectives, such as to learn techniques in planning, group leadership, communication, problem solving, or structuring problems. (A list of possible techniques can be found in the mastery list in *The SOS Handbook* [2].)

Some learners will restrict their goals to changes in knowledge. However, SOS is not expected to be superior in helping to gain knowledge. Therefore, learners are encouraged to work directly toward behavioral change when using SOS.

Participants typically fall into three roughly equal sized groups:

a. those who accept responsibility immediately and who write up clear and measurable goals;
b. those who try, but who need extra time and support from the facilitator to formulate objectives;
c. those who cannot or will not accept responsibility at this time and whose objectives are neither clear nor measurable.

We do not understand why people fall into these categories. Nor do we have any ideas how to get more people into category a. Category b people ask for and use advice, while category c people find advice unwelcome. Unfortunately, it is often difficult to distinguish between b and c people, because they each claim that they merely need more information.

Participants who fail to develop explicit and measurable goals are unlikely to achieve behavioral change. These participants may have good reasons for not using the SOS process. Some of these participants work hard using the standard approach to education, while others drop out as participants. Although this may be disappointing to the facilitator, it is best not to push people into a process that they are unwilling to try.

Selecting and Completing Learning Tasks

The learner must accept responsibility for finding and completing tasks that are relevant to his or her objectives. Experiential exercises are of particular value for learners seeking behavioral change. A procedure for developing and using experiential learning tasks is described in [3]. Table 1 provides a summary of this description. It is organized around Lewin's [4] unfreeze-change-refreeze framework. Detailed examples of experiential exercises that follow these design principles are presented in [5] and [6].

Table 1
Design for an Experimental Exercise

Unfreeze 1. Prior experience described 2. Experience generated in a structured exercise 3. Comparison between #1 and #2 4. Disconfirming evidence made available
↓
Change 1. Description of alternative approaches 2. Practice new approaches in supportive atmosphere
↓
Refreeze (see the review and application phases below)

It is important that the facilitator provide to the learners a description of tasks, which includes the objectives of the task and the resources required (especially the time requirements for each task). Examples of such descriptions are provided in [7].

Learners select from the possible tasks and specify which tasks will be done, how much time will be spent on each task, when the task will be started, and when it will be completed. In effect, they create a PERT chart.

In addition to helping learners to manage their time, the PERT exercise helps them improve planning skills. Few participants have used a PERT chart prior to the course. Fewer still have used it to organize their learning.

The PERT chart calls for commitment by the learner. As a result, it requires much psychic energy to complete. This requirement should be clearly outlined at the beginning, and part of one session should be devoted to reviewing their PERT charts.

Review

The review is part of the refreezing phase. The assumption here is that "if you can't explain it, you haven't learned it."

The learner is asked to review each task to find something of value to himself. The learner should not evaluate things outside himself (either favorably or unfavorably). The importance of this rule shows up clearly on the review forms: evaluation leads to a loss of responsibility. When this happens, learners are seldom successful in finding something for themselves.

The learner is asked to write about three things in the review for each task:

1. Describe operational things that you have learned that were related to your objectives.
2. List ways to apply something learned in this task to your job, your schooling, or your personal life. Promise yourself to do one of these things and set a time deadline in the near future.
3. What was the most important change in you as a result of this task?

As they address these issues, the participants should avoid any evaluation of the group, the facilitator, or the exercise.

Applications

To increase the likelihood of success, learners are encouraged to think small; that is, to take one small step now, rather than to plan big steps in the distant future. In effect, they are asked to use the "foot-in-the-door" technique as they plan applications [8].

Recently, we have found a mastery list of techniques to be helpful to learners as they plan applications. Some examples of the mastery items for problem solving skills are brainstorming, the systems approach, tree diagrams, and Delphi. A more complete list, covering skills in planning, learning, communication, and problem solving is provided in [2]. Learners indicate their current level of mastery using the scale in Table 2. They then plan for a level of mastery on this scale to be achieved within a fixed time period. (Although we have used the mastery list, it was not used in the experiments described below.)

Table 2
Self-Rating Scale for Assessment of Mastery

0	=	I do not understand this technique
1	=	I think I understand
2	=	I have explained it to someone else
4	=	I have tried it but was not successful
8	=	I have used it successfully in the text exercise
16	=	I have used it successfully in a new situation
32	=	I won this technique

It is important to provide support as participants practice a new technique. Typically, whenever we try something challenging and worthwhile, we are unsuccessful in our initial attempts. It is tempting in view of our early failures to give up on the new technique before gaining ownership. Furthermore, peer pressure usually discourages our attempts to practice new behavior. We have not been successful in devising schemes to support learners as they practice in new situations outside of the test exercise. One thing that should help learners is to keep in contact with their learning partners after completing the initial exercise (and after the course ends); however, this is only speculation on our part.

Results from Five Field Experiments

The SOS technique has been used in a number of crude field experiments. These experiments were crude in the following ways:

1. Self-selection was used to divide learners into the SOS and traditional groups.
2. Implementation of the SOS techniques was far from ideal. That is, the typical SOS participant gained mastery with some, but not all, of the steps in SOS. Only about one-third of these participants adopted the complete SOS process.
3. The design of the experiment was modified each time as we made improvements.

Five of these experiments were monitored. We refer to these as Sweden 1974 and Sweden 1975 for the two studies done with middle managers at the Swedish Institute for Management; Wharton 1975 and Wharton 1976 for the two studies done with MBA students at the University of Pennsylvania; and Hawaii 1976 for the study done with MBA students at the University of Hawaii. A brief description of the results is provided here. (For a more complete description, see [1]).

Our hypothesis was that SOS would be superior in helping people achieve what they regarded as worthwhile changes in behavior. Also, SOS was expected to lead to more long-term attitude changes. It was not expected to be superior for changes in knowledge, nor was it expected to lead to greater satisfaction among participants. These hypotheses were drawn from previous empirical research (see [1]).

Design of the Experiments

All five experiments were run in courses on marketing management. The calendar time was generally long, ranging from 2 to 3 months. All of the courses were designed for about 125 hours of work.

As expected, SOS offered no advantages for gaining knowledge. Common examinations in Wharton 1975 and Wharton 1976 revealed that SOS students did slightly poorer. This may have been more a function of the test than the learning, as the SOS participant devoted much less time to completing the test.) However, in Wharton 1975 there were no differences between SOS and traditional students with respect to how much knowledge they felt they had gained, as reported on an end-of-course survey.
Participant satisfaction was assessed in all except Hawaii 1976. Participants in SOS reported greater satisfaction than did students taught by traditional methods. The differences were statistically significant, but small.

The SOS participants reported greater skill development than did traditional participants. In particular, they felt they had improved their planning and learning skills. This was not surprising inasmuch as the traditional program did not aim directly at skill development.

The primary criterion for judging the alternative approaches was long-term behavioral change. This was assessed by a critical incidents survey conducted six months after each course had ended. (We used six months because if no change had occurred by that time, it seemed unlikely that any change would occur in the more distant future.) The survey asked each participant to describe incidents on his job (or in other courses, for full-time students) where he handled a situation differently because of his experience in the course. The same question was asked about changes in his personal life. The responses from the SOS and traditional participants were blind-coded. Three coders were used for each study (except Wharton 1976, which had two coders). Different coders were used for each of the five studies (with the exception of one coder who was involved in two of the studies). The coders did not know the faculty nor the participants nor the hypotheses. The coders were asked to code an event as a behavioral change only if the event had been completed; plans to do something were coded as attitude changes.

As shown in Table 3, reported behavioral changes were more than three times as likely for SOS than for traditional students. The superiority of SOS was greatest for incidents coded as "large" changes than for those coded as "moderate;" also the SOS superiority was greater for "moderate" than for "small" changes. Viewed from another perspective, SOS participants were able to report some important behavioral changes, while few important changes were reported for traditional participants. SOS was superior for both job-related and personal life changes. (Table 3 includes both types of changes.) Finally, the SOS superiority was also found for the items coded as attitudinal changes.

Table 3
Long-term Behavioral Changes
(number of respondents in parentheses)

Experiment	Average Number of Changes		Statistical Significance[a]
	Traditional	SOS	
Sweden 1974	0.4 (9)	1.5 (8)	.10
Sweden 1975	0.5 (13)	2.1 (14)	.05
Wharton 1975	0.9 (105)	1.4 (37)	.10
Wharton 1976	0.4 (17)	1.1 (20)	N.S.
Hawaii 1976	0.9 (5)	4.5 (5)	N.S.
Unweighted Averages	0.6 (149)	2.1 (84)	.05[b]

[a] Based on Fisher Exact test except in Wharton 1975, which used x^2. One-tailed tests were used in each case. (Those who reported behavioral change were compared with those reporting no change.)
[b] Sign test (one tailed).

The results are promising, especially in view of the failure rate for most educational innovations. Of course, there are alternative explanations for our results. In particular, people who are already effective learners may select

SOS. These learners might have been as effective with the traditional approach. The major argument against this alternative explanation is that our results are consistent with the prior empirical evidence (from three SOS-related studies summarized in [1]), while the alternative explanation does not satisfactorily explain the prior results. However, it would be valuable to use random assignment of learners to each treatment in future experiments in order to assess this and other hypotheses.

Summary

The SOS technique is a highly structured approach to help learners explicitly carry themselves through the four phases of natural learning— setting objectives, engaging in active learning tasks, reviewing, and making applications. Experiential exercises are used as the primary learning tasks in SOS. Five field experiments supported the hypothesis that SOS would improve the ability of learners to change. The SOS participants were able to report important changes in behavior, in contrast to the traditional participants, where little change occurred.

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