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PROMOTING LEARNER REFLECTION:
ISSUES AND DIFFICULTIES EMERGING
FROM A THREE-YEAR STUDY

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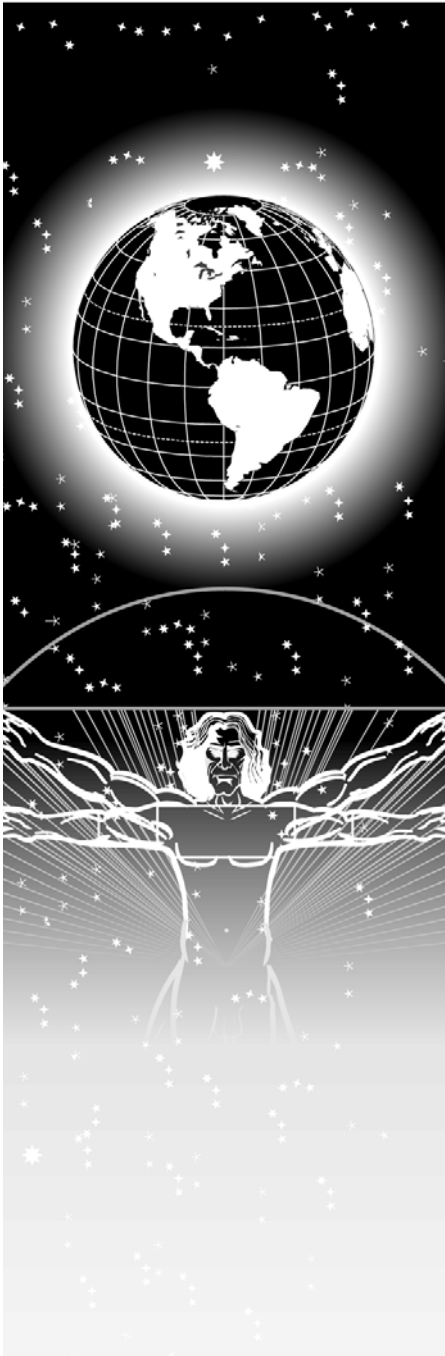**University of Georgia**
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14. ABSTRACT

Educators and trainers generally agree that reflection is a desirable activity for learners to engage in, but has proven to be relatively difficult to promote. In this report, we have described a specific situation in which systematic efforts to promote reflection achieved only limited success. A list of factors we believe individually and collectively affect the degree to which reflection occurs was presented with the acknowledgement that there is scant research to support our beliefs. Clearly, research is needed if we are to develop a proven set of strategies for promoting the reflection on action attemped in this effort. The author's reflection of reflection leads to two conclusions. First, that reflection does indeed result in enhanced learning. And secondly, that our understanding of how to tap this powerful strategy is quire limited. Hopefully, this report will prompt additional interest in the topic and eventually result in a larger body of research and theory that can be applied across a variety of settings. Clearly, advances in both theory and in development and testing of practical strategies for promoting reflection is needed if we are to obtain the benefits claimed for this important form of what is probably a uniquely human behavior.

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PREFACE

This research was conducted under a Program Research and Development Announcement (PRDA) with Peak Consulting, Contract F41624-96-C-5020, for the Air Force Research Laboratory, Human Effectiveness Directorate, Warfighter Training Research Division (AFRL/HEA). The workunit number was 1123-A1-28, titled, PRDA w/Peak Consulting. The initial Laboratory Contract Monitor was Dr Ted Lamb, of the US Air Force Academy at Colorado Springs CO. This effort was completed and documented by Dr Winston Bennett Jr, AFRL/HEA, in Mesa AZ.

PROMOTING LEARNER REFLECTION:
ISSUES AND DIFFICULTIES EMERGING FROM A THREE-YEAR STUDY

Background

Although it is generally believed that reflection is a powerful learning tool, recent experiences of these authors with three different groups of military cadets suggest that deep reflection is difficult to promote. Reflection as defined here means to think for an extended time about a set of recent experiences looking for commonalties, differences, and interrelations beyond their superficial elements (Schon, 1987; van Wright, 1992; Yinger & Clark, 1981). Such reflection would also promote linking these new experiences to earlier ones and also to what some authors (e.g., Anderson, 1984; Berliner, 1986) have referred to as the individual's mental schemata. Thus, from the instructor's point of view, promoting reflection should result in learners thinking more deeply about a topic, thereby developing a more complex and interrelated mental schema, and facilitating recall of important concepts, principles, and rules (Brown, Bransford, Ferrear, & Campione, 1983) Presumably an additional benefit of reflection would be assisting the learner in developing higher order thinking skills (Sparks-Langer, & Colton, 1991)

However, as mentioned, promoting reflection among military cadets by means of written responses to required "diaries" has proven quite difficult. The diaries were prepared by the authors to accompany a new and innovative field experience course for future civil engineers. The underlying concept of the course is to provide cadets with a set of real world experiences <u>before</u> they study the formal theories and principles of civil engineering. For example, cadets construct actual wood frame buildings, experiment with water flow in open channels, erect steel structures such as bridges and water towers, and design, construct, and test concrete beams during a summer-long field experience. In the fall they then begin classes that cover these topics employing more conventional instructional strategies.

The structure of this summer experience is grounded in the concepts of situated cognition (Choi & Hannafin, 1995; Brown, Collins, & Duguid, 1989) and authentic tasks (Brown, et al., 1989; Newmann, 1991). Situated cognition assumes a "real-world" environment in which the learner thinks about and acts on real problems. Knowledge is assumed to result as a by-product of this engagement and transfer to similar, but not identical situations is believed to be enhanced (Brown & Duguid, 1993). Authenticity is assumed to have motivational benefits as well as facilitate the learner's ability to judge the appropriateness of any specific knowledge, technique, or process when faced with another set of conditions.

Since a primary goal of the summer program is to assist cadets in developing a cognitive schema for connecting the many engineering principles, practices, and theories they subsequently study in courses, it was decided to ask them to respond to assigned diary items on a regular schedule during the course. The intent was to provide cadets with a set of questions that would require reflection as they were preparing their

individual responses. For example, cadets who had declared a major in environmental engineering were asked to explain what would be valuable to cadets majoring in other branches of engineering from a just completed field trip to a wastewater treatment plant. The assumption was that they would reflect on the environmental elements of what they had learned and that this reflection would be generally useful to other engineering specialties; thereby enhancing their own connection of key ideas and information. A parallel question asked cadets majoring in civil engineering what they thought was valuable for themselves from the just completed field trip even though its primary focus was on environmental topics. For example, civil engineers have to design and construct the physical plants associated with wastewater treatment.

Review of the cadets' responses to these and other questions indicated very little reflection had occurred and informal interviews with cadets confirmed this opinion. With but a few notable exceptions, cadets across three different years generally did not produce responses indicating any deep reflection. This despite systematic attempts by the authors to experiment with different question formats, to explain in person and in writing what was the purpose of the questions, and to describe to cadets the value of reflection to gaining maximum benefit from the summer program. Although these results were disappointing, they are consistent with the research literature on promoting reflection that generally indicates it is difficult to accomplish (Stamper, 1996).

This consistent lack of success in promoting reflection has caused the authors to themselves reflect on what might be the reasons for the cadets' behavior. (Our reflection reaffirmed our belief that reflection is a useful behavior!) Quickly ruled out was the cadet's basic intelligence. These individuals are a highly select pool from which history indicates many highly qualified future military leaders will emerge. Also, since they were rising Juniors, their base level of motivation to succeed was very high or they would not have succeeded in their first two years at the Air Force Academy. Thus, intelligence and baseline academic motivation could be ruled out as explanations of their poor reflection. It is important to note however, that we assume the cadets view the summer program as an academic activity. If the cadets did not view the summer program as an academic activity, then the dynamics and motivation to reflect would be decidedly different (and most likely altogether absent). Similarly, their academic achievement during their first two years provides clear evidence of their ability to achieve in a military environment (albeit an artificial one).

Review of the relatively limited empirical research literature on reflection (e.g., Sparks-Langer & Colton, 1991; Stamper, 1996) and our own reflection has led to identifying ten variables we believe independently and interactively affected cadets' lack of reflective behavior. We further believe many of these variables are likely to be operational in other formal learning settings with other learners and provide fruitful areas for future research. Parenthetically, we note that there is a substantial body of literature (e.g., Clift, Houston, & Pugach, 1990; Ross, 1989), expressing the opinion that reflection is beneficial without providing supporting research data. Nonetheless, even lacking solid research evidence to support their decision making, instructional designers can likely enhance the effectiveness of instruction by considering these variables as they plan

instruction that has as one of its intents promoting reflection. The variables can be grouped into three main categories: Learner Characteristics, Environmental Characteristics, and Reflection Task Characteristics.

Variables affecting the reflection process

Learner Characteristics

- Learner's skill and experience in reflective thinking
- Breath of learner's knowledge of the content area
- Learner's motivation to complete the reflection task
- Mental preparation (mental set) of the learner for the reflection task
- Degree of security felt by learner in reporting actual reflections versus perceived desired responses

Environmental Characteristics

- Nature of the physical environment in which reflection is being expected
- Nature of the interpersonal environment in which reflection is to occur

Reflection Task Characteristics

- Nature of the stimulus questions, directions, or probes
- Format required for the learner to report on results of reflecting
- Quality of the feedback provided the learner following reflection
- Consequences of Reflection

Each of these variables will now be considered separately, but obviously their degree of influence in any particular setting and their interactive effects might also be considered.

Learner Characteristics

Learner's skill and experience in reflective thinking

The ability to reflect is a learned behavior that can be cultivated by the individual over time. (Sparks-Langer & Colton, 1991) Although how reflective an individual may be to some degree a personality trait, skill in reflecting can be developed by systematically designing appropriate learning experiences for students. Von Wright (1992) makes an important distinction between reflection as a specific skill that is situated in a specific situation and reflection as a general capacity that can be applied across varied settings. Ross (1989) has cautioned, however, that it is relatively difficult to teach reflection as a generalizable skill. Learning experiences that might promote one or the other of these levels of reflection skills include describing the desired behavior, providing case examples, modeling the behavior, providing a series of graded practice exercises and accompanying guidance, and providing feedback on performance. These

suggested instructional strategies for enhancing skills in reflecting are based on our own experience as instructional designers and are deserving of research investigation since little empirical literature presently exists for the topic. Nonetheless, we believe that the cadets possessed different levels of competence in being able to reflect and that this variance impacted their ability to engage in structured reflection activities.

Breadth of learner's knowledge of the content area

The ability to reflect on a specific topic is related to how much one already knows about that topic. If one's schema for a topic is limited, there is less ability to relate new information to it. This is true for any form of cognitive learning from recall of specific factual information to application of principles or rules (Schon, 1987). Thus, it is not surprising that reflection is similarly affected by the amount of prior knowledge. In the cadet diaries an item related to wood frame building construction practices was answered in more thoughtful detail by those who had prior construction experience than those who had never before lifted a hammer. Those who had worked around construction sites had a better grasp of work flow and could describe in more detail the effects on task completion and safety of how the job site was organized than those without such prior experience. The precise nature of how prior knowledge and experience impacts one's ability to reflect deserves more research. Work on mental models and how to measure an individual's existing schema is being conducted by a number of researchers including Kyllonen and Shute (1989) and Sasse (1991).

Learner's motivation to complete the reflection task

Both internal and external sources of motivation may affect the amount and quality of reflection engaged in by the learner. While it may be possible to promote deep reflection by manipulation of external factors (e.g., grades, threats, rewards, etc.), none of these external contingencies was used with the cadets and we would hypothesize that they would not have been successful. Although subject to experimental verification, intuition tells us that overt contingency management strategies will produce superficial reflection and reporting. It may be that some subtle forms of social reinforcement would be successful, but if so, these specific forms are likely to be highly individualized.

Internal motivation by its nature is difficult to elevate and even more difficult to accurately estimate or measure. Our attempts to raise internal motivation by pointing out the value of reflection did not appear to have any impact. This was the case whether the general benefits were described (e.g., "the benefits of reflecting to learning are generally recognized"), or specific reference was made to the benefits (e.g., "to assist you in remembering the general flow of steps in framing a building ...."") in individual diary items. It may be that other strategies such as creating a mental challenge, organizing the learners into pairs to create a social learning environment, or forming competitive teams would enhance motivation, but again the effectiveness of these and other strategies for promoting reflection awaits verification. Under some conditions it seems likely that feedback during and after reflection might enhance motivation. External consequences of not engaging fully with the task may also have some impact on the motivation to reflect.

However, as will be discussed later, we believe creating highly artificial external rewards or punishments may actually reduce the level of reflection although more extensive "work products" might be generated to satisfy those in authority.

Mental preparation (mental set) of the learner for the reflection task

Although the mental set of the individual might be considered as a motivational variable, it is described separately here to highlight its probable importance to promoting reflection. Observation of the cadets indicated that in many instances they were not mentally prepared to engage in deep reflection after completing their daily work assignments. The tasks they had been engaged with were for the most part physical such as pounding nails, placing and finishing concrete, and erecting steel structures. Even when the tasks had significant cognitive components, such as surveying for a new road, cadets did not appear ready to engage in thoughtful reflection at the end of a day of hard physical labor. Although we were not able to interview them at this point about their readiness to reflect, informal conversations lead to the conclusion that they wanted to think and talk about the experiences at a much "simpler" level. Recalling humorous (and perhaps serious) events of the day, kidding each other about their skill (or lack thereof), and telling anyone who would listen how hard they had been working, dominated their immediate conversation. When these topics were exhausted the conversation often turned to food, getting cleaned up, and what they planned to do after dinner; further indicating a lack of the mental set to think deeply about the day's activities and relate them to each other and to prior experiences.

Although there is some literature describing strategies for establishing a mental set (e.g., Gagne, Briggs, & Wager, 1992), additional research on assessment of mental set as well as on other strategies, especially for use in the kinds of settings we have described, would be desirable. Timing also is related to the ability to establish a mental set. It is doubtful that the cadets we observed would have been receptive to any strategy designed to establish the mental set necessary for reflection immediately after leaving their work sites. Despite having been working hard, often in the hot sun, they were eager to talk; but what they wanted to talk about was quite predicable and the conversations were usually very animated. It seemed important that they have the opportunity for this type of social interaction with peers and staff, and any attempts to steer them to a deeper level of thinking were typically doomed. Thus, timing of any attempt to promote an appropriate mental set must also be considered.

Experimentation with "pre-reflection" strategies to set the stage for what will be expected following the instructional event should be explored as well as specific strategies immediately, and perhaps well after, the event to examine their impact on reflection. Group reflection may also hold possibilities which were never tested in the current situation.

Degree of security felt by learner in reporting actual reflections versus perceived desired responses

Candor and completeness of responses to diary items varies depending on how respondents view those who will be reviewing their submissions. When there is confidence in the professionalism and integrity of reviewers, the amount and quality of responses will be enhanced. This is particularly true when items call for making judgments about the worth of an activity or the quality of the instruction. This type of reflection can be used to promote thinking about: what was and was not included that the learner wanted or needed to learn; what the designer of the instruction may have incorrectly assumed about the learner's entering knowledge or skill; or why the instruction was or was not effective. Similarly, items might ask for suggestions on what might be improved about the program or request specific examples, scenarios or illustrations for inclusion in future versions of the instruction. These types of items may cause learners to reflect on the content as well as the instructional strategies thereby promoting deeper understanding.

However, unless the learners feel absolutely confident they can tell the truth without suffering negative consequences they are unlikely to provide honest answers. Not only will the answers be suspect, but it is also likely they will not even think seriously about the item itself before formulating what they believe will be a "safe" response. Playing it safe will supersede reflection under almost any conditions.

Environmental Characteristics

Nature of the physical environment in which reflection is being expected

The opportunity for the learner to establish an appropriate mental set for reflecting is also related to the nature of the physical environment in which reflection is expected to take place. Cadets often were asked to complete diaries at the end of long and physically demanding days in the field. However, even after they had showered and eaten they had few physical amenities available since at least part of the time they were living under less-than-optimal learning conditions. Living quarters were tight, tents were lit with bare light bulbs, and privacy was a scarce commodity. Tables or desks were generally not available, often forcing cadets to complete the diaries using clipboards or notebooks as writing surfaces. Given that both the stimulus to think (the diary item) and that the recording of the results of their thinking had to be handwritten under marginally supportive physical conditions, it was obvious that the physical environment had a significant negative influence on any attempts at reflective behavior. Actually, our results, especially the last year, may have been the result of an interaction of a number of key variables, which alone may not have impacted reflection in a negative way, but taken together, resulted in dramatically poor reflection. Although one could argue that reflection is a mental task, the poor physical surroundings did have a negative impact on what was recorded in the diaries and had a similar negative effect on the mental activity that preceded it. There was no evidence that cadets had reflected but simply not recorded the results of that reflection. It seems safe to conclude that little reflection of the type desired took place.

Other factors that may contribute to a poor physical environment, even under less primitive conditions, include: competing stimuli (e.g., TV, personal conversations, etc.), ambient noise, poor ventilation, high or low temperature, uncomfortable furniture, and perhaps even the color of the surroundings. The question of how extreme any of these conditions must be (alone or in concert with other variables) before they begin to impact one's ability to reflect is another area of potential research.

Nature of the interpersonal environment in which reflection is to occur

Although not explicitly examined during our three years of working with the cadets, the nature of the interpersonal environment probably affects the amount and quality of reflection that occurs. Due to the highly competitive conditions at the academy, collaborative learning is not a routine experience. In fact, the diary assignments were seen as an individual requirement that each cadet was expected to complete and turn in for review. Also, it is an Air Force Academy regulation that if a cadet receives any assistance of any type (no matter how small) on any assignment, this must be noted on the work that is submitted. Failure to adhere to this requirement has serious consequences. Thus, no interaction among cadets would occur during diary completion unless they were specifically instructed to do so.

It may be that environments that require (or at least permit and promote) interpersonal interaction will result in greater reflection. This hypothesis is based on social learning theory. Social interaction may enhance motivation and prolong engagement with the task. Social interaction would almost certainly bring forth more information and ideas that could be shared by those involved and perhaps result in thinking more deeply about the topic. Exhaustive review of cadet comments from individual diary items suggests that this sharing of information would have been beneficial since they often reported different ideas and insights from the same experience. Interaction with other cadets, perhaps under the guidance of an instructor, staff member, or more senior cadet skilled in leading group discussion, might have promoted reflection. However, Stamper (1996) found that peer dialogue in a computer mediated environment was not well accepted by her subjects and generally was not successful. However, here is a place where intervention during the pre-training for the flight commanders may have a payoff. The payoff is in terms of teaching them how to be better reflective stimuli and probes of their flight membership to help facilitate the reflection process.

Reflection Task Characteristics

Nature of the stimulus questions, directions, or probes

The nature of the stimulus to reflect also will impact the quality of the reflection. Surbeck, Han, and Moyer (1991) identify three different levels of reflection that they label reaction, elaboration, and contemplation. They believe the nature of the stimulus or directions initially provided the learner as well as the feedback provided to them after initial reflection, will determine the extent to which they reach the contemplation level of reflection.

Over three years of experimenting with different forms of questions and probes we have determined that most of the typical forms of questions found on tests and quizzes do not promote serious reflection even when the students are specifically instructed to do so and the benefits of reflection to enhancing their learning are described. Obviously "fact" questions (e.g., What are the functional areas of an air base?) do not promote reflection. But posing hypothetical situations (e.g., Assume you have inherited a significant sum of money and wish to buy land in an environmentally sensitive area on which to build, what factors will go into your decision and why?) produced similarly disappointing results. In contrast, the most successful probe asked learners to write a one page letter to a parent, sibling, or other significant person in their lives. However their is a limit to the number of this specific type of question there can be the pool of items, so the problem remains how to develop other questions or probes to promote reflection?

Almost invariably during the first two summers, cadets used vivid language, provided rich detail, and reported on the value (or lack there of) of the past two to three weeks of intensive activity. It appears that stimuli containing an evaluative dimension seem to promote more recall and reflection than those that require dealing only with recalling and describing the substantive content. Casting diary items in the form of personal correspondence to a person with whom they are close also played a role as well, since many responses included personal comments for this type of item. For example, comments such as, "How is my dog doing?" suggest that the letter writing item took on a strong personal reality even though the diary was turned in and not actually sent home. Even letters to a future cadet in the program often contained personal comments such as, "Have a good time" and "You will really enjoy the beach time."

Based on a small sample case study, Stamper (1996) concluded that explicit guidance promoted reflection for only one-half of her subjects, but why this was the case is not known. As of now there is little in the way of specific recommendations that can be made to instructional designers as to how much of what type of guidance to provide learners when attempting to promote reflection.

Format required for the learner to report on results of reflection

Another variable not examined in our work, but that may affect both the reflection on, and reporting of, the results, is the format in which they are reported. Yinger and Clark (1981) believe that the requirement that the results of reflection be written down is more powerful than reporting them orally. However, handwriting is slow, requires a writing surface, and revisions or extensions of what has been recorded are less likely than for products produced on a word processor. Word processing has the advantage of easy revision, but requires that equipment be readily available. Both handwritten and typed responses do provide a permanent record, a disadvantage of verbal reports (unless they are recorded). For our research purposes, all cadet diary entries for the first two years were transcribed so they could be analyzed using qualitative software, but that involves considerable time and expense. Verbal reports might be more extensive since most individuals can talk faster than they can write or type and may feel more obligated when preparing to make a verbal presentation. Verbal reports when presented "live" could

have the additional advantage of interaction of the learner with other learners and with the instructor and under some conditions additional "real time" reflection might occur. However, the demand on instructor time would be dramatically increased if many learners were involved.

In summary, we believe that the format required for reporting the results of reflection can influence both the amount of reflection that takes place and the quantity and quality of the responses generated. Format probably interacts with a number of other variables and any format decision would need to take into account the existing skills of the learner (e.g., typing, handwriting, verbal) as well as logistic factors (e.g., time, equipment). Whether a permanent record is desirable or required is another instructional design decision when selecting a format.

Quality of the feedback provided the learner following reflection

Feedback can take many forms ranging from no feedback, to acknowledging that the work was done, to commenting on how well it was done, to extending beyond or elaborating on what was submitted. (Surbeck, Han, & Moyer, 1991) At the first level, providing no feedback had a substantial negative effect on cadet behavior. Cadets did not continue to submit work when there was no evidence that it made any difference. This was demonstrated during the third year of the program when cadets were given little if any feedback on their diary submissions due to a change in course management. The predictable result was that the quantity and quality of responses diminished substantially. Although there was not a great deal of reflection evidenced in the first two years, at least all the diaries and all the items were completed whereas in the third year many diaries were not even submitted toward the end of the program.

Evaluative feedback can take many forms, but for promoting reflection would require more than just assessing whether or not the work submitted was acceptable. Feedback in the form of praise from a respected individual such as, "You did a nice job on that item" or "I like the analogy you used in your answer" would likely have a positive effect on motivation to think more deeply before responding to future items.

Extending beyond evaluative feedback might have even more powerful effects. Providing probes such as, "Have you thought about how a skilled operator might do this?" or "But how much does safety really get compromised when you don't use safety shoes?" may cause the learner to continue to think about the topic. Pointing out other possibilities such as, "Another factor you might consider is how many different tools will be required if you use different size bolts in the design," or "But what if the rate of water flow is doubled?" also may result in additional thinking about relationships among factors not previously considered. Although such enhanced feedback may be provided via written comments, they are probably most powerful when used interactively in interpersonal dialogue. Carrying on a dialogue with one or more learners about the work they have submitted is probably the ultimate in promoting reflection via feedback. But the logistics of doing so and having discussion leaders who are skilled in the content and

possess good interpersonal skills may be beyond the capacity of the system to provide; unless it is computer mediated in some way.

Clearly, the amount and quality of feedback provided affects the amount and quality of reflection taking place. Feedback affects future motivation to reflect and when sufficiently elaborated, may result in additional reflection on the original topic. As in other forms of learning, feedback is an important variable to consider when designing instruction to promote reflection. However, managing an extensive, frequent, personalized, and elaborate feedback process is a challenging logistical and cognitive endeavor when a large number of learners are involved as any classroom teacher will testify. How some of this type of feedback might be facilitated within a computer mediated communication environment provides an important research agenda for the future.

Consequences of Reflecting

Cadets in the third year produced much less "rich" letters even though the same diary items were employed. The letters home, requested after the first two weeks of the program, were somewhat less thoughtful than in previous years, but generally provided some evidence of reflection. However, the letters to a future cadet in the program requested at the end of the program were generally dismal and in some cases a blank sheet of paper was submitted. The substantial reduction in feedback was largely the result of a significant drop in the amount of faculty time devoted to this course as other department priorities emerged. In the first two years, extra faculty time was assigned to it since in was still in the developmental stage. However, by the third year it was felt the course needed to operate with only the amount of faculty time required of other courses. The result was that the faculty had little time available to read and respond to the diaries and it became obvious to all involved that there would be no negative consequences (and probably no positive ones either) to their not being completed.

Thus, we believe the poor completion of the diaries was a direct consequence of the staff not taking the diaries seriously and when it became known to the cadets that not completing the diaries had no consequences, they also stopped taking them seriously. This is a totally rational behavior on the part of cadets and indicates how the variables being described interact rather than operating independently. Despite the fact that some of the diary items were of proven effectiveness in earlier years, they did not work well in year three because of the feedback (albeit indirect and unintentional) that the diary assignments were not important.

SUMMARY

In summary, educators and trainers generally agree that reflection is a desirable activity for learners to engage in, but has proven to be relatively difficult to promote. In this article we have described a specific situation in which systematic efforts to promote reflection achieved only limited success. A list of factors we believe individually and collectively affect the degree to which reflection occurs was presented with the

acknowledgment that there is scant research to support our beliefs. Clearly, research is needed if we are to develop a proven set of strategies for promoting the reflection-on-action (Schon, 1987) attempted in this effort. Kottkamp (1990) also presents ideas on how to promote reflection that are deserving of additional research.

To complicate the issue even further, Liston and Zeichner (1996) have posited a five-part taxonomy of reflection of which reflection immediately (or at least shortly after) upon completion of the action is only one type. According to Liston and Zeichner reflection can occur: rapidly during an action; thoughtfully during an action; briefly as a review after action; systematically over a period of time after action, or long-term as one attempts to develop formal or informal theory. As noted, we have dealt only with reflection immediately (or at least within a few days) after completion of the learning activity. Thus, in addition to the variables we discussed that are relevant to this one form or reflection, there no doubt are other variable to be explored to related to the other forms of reflection contained in Liston and Zeichner's taxonomy.

The authors' reflection on reflection leads us to two conclusions. First, that reflection does indeed result in enhanced learning. And second that our understanding of how to tap this powerful strategy is quite limited. Hopefully this paper will prompt additional interest in the topic eventually resulting in a larger body of research and theory that can be applied across a variety of settings. Clearly, advances in both theory and in development and testing of practical strategies for promoting reflection is needed if we are to obtain the benefits claimed for this important form of what is probably a uniquely human behavior.

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