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Studying the Learning Unit "Microbiology:" Students' Motivation, Portfolio and Classroom Management

MAHMOOD KHALIL (mahkh@Sakhnin.ac.il),
The College of Sakhnin for Teacher Education, Sakhnin, Israel

ABSTRACT *In this study, a learning unit on microorganisms for ninth-grade students was developed, based on the Science - Technology – Environment- Society (STES) approach. The learning unit contained 15 learning tasks, which were performed in individual and cooperative learning settings, using a variety of teaching/learning methods with an emphasis on the interdisciplinary approach. The study goals were to investigate the impact of the learning unit on ninth-grade students' cognitive and meta-cognitive domains and attitudes toward peace. The sample included 91 students from two classes in villages A and B, and one class of gifted students in Arab schools in the north of Israel. The unit enableed the evaluation of the learning process through students' portfolios, semi-built-in-interviews, and closed questionnaires toward environment and peace. Both, quantitative and the qualitative analyses were used. The portfolio content analysis showed a significant improvement on the cognitive and meta-cognitive knowledge of the students, including asking questions, higher order cognitive skills, argumentation skills, self-evaluation and reflection. Triangulation of data assured the high reliability of the results, which revealed a significant improvement in attitudes toward environment and peace. We therefore suggest developing the concept STES to STEPS: Science– Technology– Environment– Peace– Society.*

Key-words: *classroom environment, cognitive and affective domains environment, learning unit, microorganisms, peace, portfolio, STS, motivation.*

Introduction

Needless to assert that there is a definite link between motivation and classroom management. It almost goes without saying that efficient classroom management is in harmony with the principles of learning and motivation. When students find an interest in the suggested syllabus and can cope with it, they are more likely to correspond with it, learn hard, be deeply engaged in all class activities and home assignments, and eventually attain good results. However, when students have difficulty perceiving the subject matter of the lesson or have little interest in it, they are overwhelmed by feelings of alienation, boredom and frustration, which may develop into absenteeism, truancy, failure and violence, to say the least.

Research has always demonstrated that in situations where students are of learning tasks, teachers with little experience tend to concentrate on students' behavior, while veteran ones re-check the content of their lessons and think of innovative ways capable of attracting the students' attention and of intensifying their motivation. They even ask questions such as: Is the learning material so com-

plex and unfathomable that students have grown alienated, frustrated and indifferent, or is it so easy that bored students swiftly embark on the track of misbehavior and trouble-making? What are the students' real interests? Are they more motivated to interact with their peers than to acquire new skills and gain updated knowledge?

These questions assert the strong relationship between motivation and classroom management and shed light on the contribution of each to concentrating on the learning process and the accomplishment of learning goals in particular, and to the promoting of educational and learning processes in general.

In this study, the learning unit "Microorganisms," developed by Khalil (2001) in a Science-Technology-Society (STS) approach, was taught to junior high school students in Arab schools in the northern part of Israel. Students' perceptions of the learning process while studying the learning unit was evaluated through portfolio planned and written by every student, which served as a measure for their motivation. Students' motivation and classroom management were also investigated.

The Learning Unit: "Microorganisms"

The unit consists of fifteen learning tasks developed by Khalil, (2001) and performed on individual and group learning settings. The unit is based on the biology principles of the "Unifying Themes in Biology," (Schwab, 1963, p. 31); diversity of type and unity of pattern in living things; the complementarity of organism and environment; and the complementarity of structure and function. Additionally, the function of microorganisms in cycles in nature, their role in the food chains and in the human health was emphasized along the fifteen learning tasks as the main idea, which connected the topics of the learning unit on the basis STS approach. This unit helped students to develop their laboratory skills, to promote their scientific thinking, to enhance their problem-solving abilities and their abilities to form independent attitudes, and to make proper evaluations relying on knowledge and reflection. Their engagement in team-work nurtured their sense of cooperation, appreciation of others' work, efforts, achievements, self-confidence, tolerance, competition and patience, thus requiring variations of teaching/learning methods.

The unit was meant to unearth the reality of an invisible, amazing and exciting world. Admittedly, these microorganisms are of paramount significance for the alive world and man, especially in the spheres of health, industry, biotechnology, and life cycle in nature. On the other hand, since microorganisms are known to be major causes of diseases for man, plants, and animals, necessary precautions must be seriously taken and safety rules were strictly followed all the time, (which was done along the practical part of the research including laboratory work and field trips).

The activities that were included in the unit related to conducting experiments (in groups), reading scientific articles individually and in groups, watching video-movies, going on a school trip, role-playing, learning in jigsaw groups, and looking up information in academic sources (Khalil, 2001). The unit was accompanied by a video tape containing carefully selected films borrowed from the Israel Educational Television service.

Learning material in this unit was designed, taught and exposed in a way that arouses students' excitement in terms of content and teaching styles. Practical benefits and clear links to daily life were highlighted; the learning materials included societal aspects of content that marked the concatenation between society, science and technology, so the principle of Science-Technology-Society (STS) served as a source of inspiration.

The microorganisms' subject was selected, due to their broad role in the nature, from their use in biological research, genetic engineering and biotechnology in one hand, and their role in the elements cycles in nature, food industry, plant life, health and diseases in the other hand. For example, one of the learning tasks includes the problem of sewage and clean water, which, if not treated, can cause diseases. In case of two villages or two close nations, this problem requires overcoming the issue by mutual efforts based on learning, understanding, and good relationships. Thus, microorganisms by connecting science, technology and society are ideal subject for learning units developed on the STS approach, and can be investigated on their possible influence on people attitudes toward environment and peace.

Literature Review

In this part, attempts will be made to define motivation and briefly point out its different types, its goals, and its enhancement based on the existing literature in the field. Motivation is one of the most important aspects in the field of education. Its importance lies in the fact that learning never takes place without the presence of motivation (desire, enthusiasm) to learn. Ames (1992) reiterates the significance of motivation, while noting that people in education should bear in mind three important aspects that are motivation, motivation, and motivation. This is so because motivation has three major goals: driving motivation, directing it towards a certain goal and maintaining a type of behavior for a long period of time. Hence, for the purpose of knowing how to stimulate people in the process of learning, teachers must be aware of the fact that motivation has numerous traits. Of these comes in the forefront a list of important facts that emphasizes motivation as a driving and self-created force, that is, a force which directs behavior that creates a target inside the individual, which is linked to a person's needs and which is driven by internal as well as external factors.

Long before Ames (1992), the role of motivation in enhancing the human situation was recognized by Maslow (1968). He found that motivation originates in the individual's basic needs that consist of three major elements inherent in every individual and that control his behavior: the need for independence, the need for belonging, and the need for mastery and power. Motivation is an inner force that arouses the individual's behavior and directs it towards the attainment of a certain goal, which is highly rated on the scale of the individual's material or psychological needs. In other words, motivation depends on internal factors composed of the individual's needs, traits, inclinations and interests, or by environmental ones, such as, people, things, ideas, issues, and tools (Johnson & Johnson,1985). Motivation as a group of internal and external factors that push an individual to regain balance or obtain a certain target for the purpose of satisfying inside and outside desires and needs was similarly noted by Maher and Midgley (1991). Motivation is proba-

bly the most influential element in the learning process and Ames (1990) asserted its centrality in the educational process for all students at all levels.

It might be assumed that the concept of motivation indicates a state inside the learner that urges him/her to pay more attention to the learning attitude and to perform directed and cued activities, until learning is realized as the learner's goal. Hence, evaluation methods endorsed by schools have a direct impact on students' motivation albeit in varying degrees. Whereas conventional examinations influence external motivation, assignments and take-home tests accelerate the growth internal motivation (Mitchell, 1992; Shulman, 1992). To better invest and make use of the individual's potential for acquiring knowledge and subject matter based on motivation; it is of utmost importance that schools enact an evaluation system relying on measuring the quality of the learning process that originates from the students' inner motivation rather than on sheer marks derived from a conventional system of examination.

Students' Portfolio

The benefits of using alternative standards for evaluating students' perceptions of the learning process have been asserted by a number of researchers. The use of portfolio for evaluating students' motivation, interaction and sense of responsibility was recognized and suggested by several researchers (Mitchell, 1992; Shulman, 1992; Rozner, 1998). The endorsement of the portfolio as an evaluation tool adds much to students who are propelled by tendencies for independence, equipped with a strong sense of self-criticism, and endowed with high internal motivation. After making the distinction between internal and external motivation, the conventional examination system assists in pushing up external motivation only, while the use of portfolio increases internal student motivation.

Classroom Environment and Management

Classroom management may be defined as doing what one can do to establish classroom environment conducive to learning and academic accomplishment. Classroom management is a major and necessary factor contributing to efficient learning. It attracts students' attention, keeps the channels of communication between learners and teachers open, and, above all, grows healthy and friendly relationships among students, and between students and the teacher. Without proper classroom management, which is usually very noticeable in the classroom and consequently measurable, the processes of learning and teaching are at stake and will never flourish without appropriate classroom management (Brophy & Good, 1985).

There are, however, a number of requirements needed for securing good classroom management, so that desirable educational objectives, efficient learning, and psychological and substantial environment are prevalent, (Anderson, 1995). Bennett (1987) demonstrated that good organization of the classroom and appropriate equipment and tools are necessary, in addition to the number of students and their seating in the class. Obviously, the availability of these educational tools and items in the classroom fosters the processes of learning and teaching, while their absence presents a serious hindrance to potential progress in the educational process. A similar conclusion was drawn by Fraser (1986), who ascertained that

in several developing countries where students were provided with the necessary school tools and books exhibited more success than students deprived of the same educational facilities.

Regarding the psychological environment, it is usually perceived as the climate or the atmosphere existing in a social group that can potentially influence students' motivation and learning (Anderson, 1995). When the classroom is engulfed by proper psychological climate, every student will enjoy the opportunity of being present at a place where teacher and students interact in positive, co-operational and respectful manners, and where all the involved parties are fully conscious of their objectives and bear the entire responsibility to coordinate their efforts in order to achieve their objectives.

Interestingly, the concept of classroom management attributes great importance on various aspects of management represented by discipline and order as well as by different factors linked to teachers, students, curricula and human relationships existing in classroom. Hence, classroom management has little chance to survive along with noise and other types of undesirable behavior and nuisances. Appropriate classroom management can lead the students to un-trodden places, where they can have new discoveries and achieve stupendous successes.

Research Design

Sample

The sample of the study consisted of 91 junior high school students from Arab schools in the north of Israel. Among them, 73 (80.2%) attended two ninth-grade regular classes from two villages, and 18 gifted students (19.8%), as indicated in Table 1.

Table 1
Distribution of Students by Study Groups and Gender

	Number of students	Percentage (%)	Male (%)	Female (%)
Regular Class Village "A"	39	42.9	61.5	38.5
Regular Class Village "B"	34	37.3	52.9	47.1
Gifted Class	18	19.8	38.9	61.1
Total	91	100		

The two regular classes were randomly chosen from ninth grades at the two schools, which agreed to take part in the research. The students from both classes were homogeneous in terms of academic achievements. The gifted students, who volunteered to take part in the study, attended classes at a regional teacher center.

A special workshop was especially set up at the outset of the project to train the teacher from village "A" to acquire the skills in teaching and handling STS subjects, and evaluating students' portfolio. The class from village "B" and the gifted students were taught by one member of the research team. Prior to the present study, all the students of the sample studied topics in biology as follows. At seventh grade, they studied "Water and Life" by Agrest (1986); at eighth grade, Reproduction in the Human Body, Animals and Plants, by Kahana and Marx, (1989); at ninth grade, Chapters in Genetics, by Sivan, Orabi, Nahman, Kavee and Cohen (1988), and

Chapters on Nutrition in the Human Body, Animals and Plants by Sivan, Orabi, Kavee, and Abu Alafia (1993). All the books were edited by The Ministry of Education and Culture of Israel, and are recommended by the national curriculum. As it can be seen, none of the students learnt microorganisms in the past.

Instruments

Questionnaire for Motivation: The motivation questionnaire was prepared along three stages: During the first stage, nine categories relevant for the present study were selected from the questionnaire developed by Rozner (1998), which emphasizes the following elements: home assignments, attendance, accomplishments, listening to others during the lesson, skill promotion, teacher-student interrelationships, active participation, time input and enjoyment. The categories were content validated by two science educators, experts in evaluation. Fourteen questions were then (second stage) developed based on the nine categories, while each question was related to the components of motivation as defined in the previous stage. The suitability of the questions to the categories content was validated by the same two science educators as in the first stage During the third stage, the questionnaire was administered to classes other than the study: one class from village "B" (33 students) and another class from village "A" (37 students). This choice was meant to give researchers the opportunity to check different possible aspects of the questionnaire, which might have had an impact on the performance of study groups in the process of the experiment itself, such as: clarity of handwriting, clarity of questionnaire, its structure and students' understanding of it. Students' answers and notes were taken into consideration when the final version of the questionnaire that is shown in Appendix A.

Likert scale from 1 to 5 was used for coding students' answers on the questionnaire: Fully agree= 5; agree=4; not sure=3; disagree= 2; fully disagree=1. Items 6 and 13 were phrased in a negative form and were coded 1 to 5.

Motivation was assessed prior and after teaching the learning unit in all the three study groups. In the regular classes, however, motivation was also measured during the study after students had performed the first seven out of the fifteen learning tasks included in the learning unit. For the purpose of keeping confidentiality students were not asked to state their names upon answering the questionnaire.

As already indicated, evaluation of motivation depended on data obtained from the findings of the closed questionnaire and analysis of portfolio contents. The values of alpha Cronbach were calculated for the motivation questionnaire and were found to be .79, .73, and .80, before, during and at the end of the study. Students' performance expressed in their portfolios that included files of assignments and questionnaires on reflective thinking were analyzed by one of the research team.

Results

Data obtained on the motivation questionnaire were assessed pre, midterm and post by study groups and were treated by ANOVA with repeated measures analysis, compared for significant differences. Mean scores, standard deviations, F- and P- values are presented in Table 2.

Table 2

Mean Scores, Standard Deviations, and ANOVA with Repeated Measures on Motivation by Study Groups

Measurement	Pre- Studying the Learning Unit		Midterm Studying the Learning Unit		Post-Studying the Learning Unit		
Sample	X	(SD)	X	(SD)	X	(SD)	F
Regular Class Village "B"	3.73	(.38)	4.06	(.38)	4.17	(.45)	
Regular Class Village "A"	3.72	(.45)	4.40	(.34)	4.51	(.55)	
Gifted Class	3.94	(.76)			4.45	(.36)	- 2.38
F	NS		13.24**		11.62**		6.40**

** ($p.<.01$) , NS = No Significant

In order to better illustrate the results they are presented in Figure 1

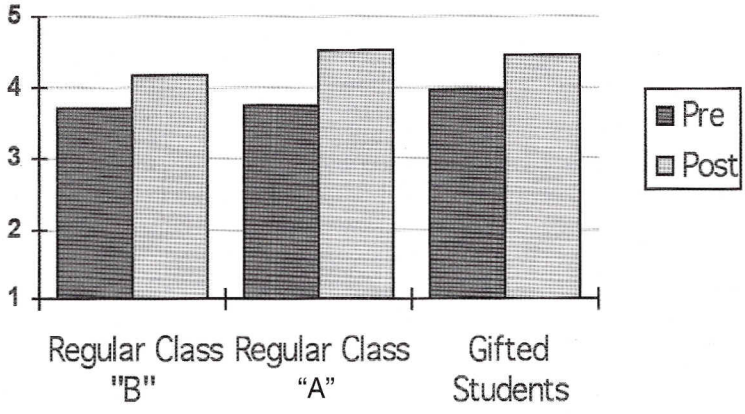

Figure1. Students' Mean Scores on Motivation by Study Groups

The results presented in Table 2 and Figure 1 show that following the study of the learning unit, students' mean score on post motivation test were significant higher in all the study groups.

Analysis of Students' Portfolios

Students' reflection on the learning process was analyzed on three levels; affective, cognitive and meta-cognitive.

The Affective Level. Students showed an increase on their inquisitiveness and on the questions related to the topic learned. Their desire to observe and to follow the microorganisms' life indicated their pleasure, enthusiasm and desire to pursue these innovative types of learning experiences. They wrote that they devoted long hours to looking up and studying source materials in school library in order to cope with their assignments. Students engaged in this study reported assertively about their interest in the subject, which was expressed in their behavior and interaction in terms of will, desire and seriousness while learning. The findings confirmed that there was a rise in the motivation of all students who studied the learning unit. The driving desire to accomplish the tasks, the pleasure that accompanied

their search and the time devoted to the topic was mentioned by students' parents. Students reported about their self criticism regarding their learning.

The Cognitive Level. Students developed and have improved their skills of reasoning, judgment, to explain and defend their learning activities. Some showed creativity in their work and ability to summaries from different sources. Their skills to conclude improved and they mentioned that the learning process of the topic directed and encouraged them to use more the inquiry approach on learning.

The Meta-cognitive Level. Students identified the considerations required in the process of decisions making. They mentioned that in the past affective considerations impelled them and now in a conscious mind they are using cognitive considerations as important components on the decision making process. The students can now identify problems and obstacles while are posing with the performance of a new learning task. Some time they suggested strategies, solutions and corrections. They came with more focused ideas and showed improvement in their reasoning ability.

Discussion

Qualitative and quantitative analyses of the research findings were conducted separately for each class of the study groups. Since students in the three study groups were exposed to identical factors and enjoyed the same social conditions, the different findings obtained are a crucial pointer to the impact of the learning unit on students' motivation.

The rise in the mean scores of students' motivation may be ascribed to a variety of factors weaved in the learning unit "Microorganisms", its preparation and designation, its contents, its introduction and implementation and the ongoing reflection on it, among them: the variation of teaching/learning methods practiced in lessons, variation in the contents of learning material, use of alternative evaluation standards, science-technology-society, teacher role, classroom management and the establishment of productive classroom environment and devising strategies to remedy behaviors.

The Variation of Teaching/Learning Methods Practiced in Lessons

Traditional teaching where know-all teachers provide passive students with the material they need gave way to a new educational climate in which all participants in our research were engaged in the processes of teaching and learning and benefited from the gains. Every lesson was considered a journey: students were travelers among the learning tasks. Each task had its own special structure, set its own goals and performed different activities with focus on its own strategies. The students enjoyed the freedom to move from one task to another and the preparation, the learning and the perception of the material was their total responsibility. What whetted their appetite for learning were: conducting experiments, going on educational trips, watching movies and joining team workshops on the different tasks, (Khalil, 2001).

The relationship between teaching styles and student motivation has been known for long, (Bloom, 1976; Ames, 1990; Maher and Midgley, 1991). The same conclusion was reached by Caesar, Hofstein and Lazarowitz (1994), who affirmed

the existence of positive ties between students' interests and motivation and the use of various teaching modes in biology. Likewise, it was found out in very recent studies that the integration of the internet and learning in groups into the life of the classroom generated enthusiasm in the students (especially those who studied science), fuelled their ambitions and increased their sense of motivation (Huppert, Lomask and Lazarowitz, 2002).

Variation in the Contents of Learning Material

The variation in the contents of teaching material contributed much to turning the school assignments and lessons into pleasant learning/teaching experiences. More important, this variation allowed students who found little excitement in a certain task to choose what fit their tendencies and likes.

So the use of different teaching methods in addition to variations in the content of the material taught/learn, generate motivation and increase it when it is there. Furthermore, they may help promote students' intelligence and even multiply it because, as Gardner (1992), proposes students' interests and motivation are reliant on the extent of the development of their different intelligence types.

Internal Motivation and External Motivation

Students' modes of behavior are sometimes governed by internal motivation and at others by external motivation (Deci, 1971). Inner motivation occurs once the task performed involves personal elements. When students, for example, are so much engaged in a certain assignment which is likely to bring them happiness or help them promote a significant or morally acceptable skill worthy of pursuing, then these students are under the direct influence of inner motivation. External motivation, however, is formed by a collaboration of factors outside the students' selves and far away from the core of the task to be done. Take, for instance, the desire to get high marks, and have special privileges or meet any other targets that drive them to perform these activities. It is only natural that inner-motivated students perform their tasks more willingly and are eager to study class material more seriously and with deeper perception than externally-motivated students who are continuously invited to pay attention to and show interest in the lesson material and who are often devoid of any ambition to satisfy the minimal school demands (Shulman, 1992; Mitchell, 1992).

These instructions inspired the teachers engaged in the research. To equip the students' motivation with more energy, first the teachers' approach was intended to make students be truly convinced in their ability to succeed in performing their particular tasks (the students' belief that they could successfully cope with learning unit became a goal which drove them to do whatever they could in order to fulfill it); second, students had the freedom of choice, freedom of expression and self-determination for this enabled them to direct their energy, control their inclinations and choose what fit these inclinations.

In order to make the concepts of self-responsibility, self-autonomy and self-determination an integral part of the students' everyday experience, it was obligatory that the teachers acknowledge the significance of students' reflections on what they could do, how they could do it and how they could enhance it. Furthermore, special emphasis was put on forming class rules and norms which were meant to

guarantee students' rights to achieve their goals rather than govern their modes of behavior. It was also necessary that teachers illustrate the different tasks and activities (even if these had not been internally motivating) and ascertain their role in the accomplishment of long term goals. And they had to discourage students from dependence on outward incentives for the purpose of increasing motivation towards learning and performance improvement.

Use of Portfolio as an Alternative Evaluation Mode

The use of students' portfolios as the major source of evaluation took the students to new spheres where they had the opportunity to be more active and involved in the lesson happenings and where they could bear full responsibility for the processes of learning and teaching. This was achieved by integrating the students in defining the evaluation rules which seriously considered self–evaluation, peer evaluation and repeated evaluation of portfolio in case of failure, etc. Doubtlessly, when this evaluation system was implemented, not without proper explanation to students, it released students from unnecessary sense of pleasure, fears and threats which are markers of the conventional evaluation system.

Classroom Environment and Teacher Role

Naturally students vary widely in the ways and levels of response to the diversified school activities and in the various skills with which their educational facilities provide them. These variations can be ascribed to personal factors, or external ones, i.e. the educational environment and its ability to stimulate students' motivation to learn. Thus, teachers' use of various sources of external motivation (high marks, financial prizes, praise and complements, special privileges or other incentives) is very important in the educational process, thanks to its central role in enhancing students' learning. At the same time, it must be warned that frequent dependence on these types of incentives, despite their importance in boosting a desired mode of behavior, may cause irreversible harms: students' sense of discipline may get weakened and their internal motivation may lose much of its vigor and energy. After all, the major aim of education in the long run is to give birth to internally-motivated learners whose studies can help them attain high levels of accomplishment and success owing to their inner desire rather than to material or verbal incentives given to them.

In order to meet the principles mentioned above, and in order for the teaching process to be more vital and active, efficient, successful and interesting, teachers in this project gave close attention to several significant factors. One is concentrating on students' interests. As already pointed out, students were more engaged in their studies when they found correlation between what they learnt and what fit their interests and needs. The insertion of a variety of methods and strategies along with offering coordinated subjects provided the students with new opportunities for thinking, imagination and freedom of choice. This approach guaranteed a substantial increase in students' interests in school subjects and contributed to the creation of educational climate in which students were able to learn and accomplish their learning tasks.

Moreover, teachers engaged in the research and based on the instructional

mode of Deci et al., (1991), showed personal interests in the subject taught and presented themselves as models to be followed. In so doing, they gave much boost to the development of students' internal motivation and most likely whetted their appetite to learn more. Moreover, teachers seized every opportunity to demonstrate to their students how their own pursuit of their subjects helped tangibly enrich their personal experience or let their students see real examples of other people who managed to achieve success owing to their excessive interest in school subjects. This means that since teachers were truly and pleasantly involved in the subjects they taught, students responded accordingly.

Furthermore, teachers took upon themselves the task of pushing the students' desire to learn forward by helping them to deeply root and highly grow this desire and by accompanying the process of their growth through deeds and words which were intended to provide the students with unconditioned support and care. This teachers' behavior is defined as "self-fulfilling prophecy." When students are expected to yield good results and when they are made to have positive attitudes concerning school subjects, their desire and readiness to successfully cope with these subjects are accordingly tuned.

In addition, teachers, as already explained, did their best to let students have values, goals and ambitions based on learning principles at the expense of merely getting high marks and succeeding in exams. Teachers' endorsement of such an approach fueled students with deep perception and skilled mastery of their courses and consequently qualified students to opt for achievable goals and challengeable targets. At the same time, they avoided giving difficult and unattainable tasks which could have led to frustration, loss of energy and revulsion from school and learning.

Owing to the fact that classroom management refers to the teacher's overall attitude and behavior inside the class, the teachers involved in our research persistently sought to establish proper classroom environment. They took into account all measures that increased students' motivation to learn and reduced all non- and counter- productive types of behavior. They understood that it was their duty to create a classroom climate nurtured by mutual respect and cooperation and friendly atmosphere and took all remedial steps which could not only find solutions to trouble-making but also prevent it.

Following Bennett (1987), who studied the interrelationships between classroom management, school environment and learning, teachers knew that students' seating in the classroom has a direct impact on teachers' management of their classes and so students were seated in places where they could physically see their teacher, watch his every move (facial and body gestures), observe his activities and educational tools he used and got the chance to listen to his verbal and nonverbal speech. This implies that teachers always matched the students' seating to the activities they performed in the classroom and never maintained an arbitrary order of seating. In so doing, teachers were able to attract students' attention, increase channels of communication, allow more interactions with students and help create productive school environment characterized by mutual tolerance and unconditioned acceptance, well-defined rules and systems, students' active engagement in decision-making and skilled planning and performing of class activities.

Classroom Management and Teacher Behavior

Every move that is intended to disrupt the natural flow of the lesson or cause confusion and mess inside the classroom is considered a form of "of task behavior". While some forms of "of task behavior" are trivial and of little influence on academic achievement, others pose a serious threat to the process of learning and teaching and are likely to endanger the students' physical and emotional safety, let alone academic achievements. To handle these bad modes of behavior, teachers, in line with the propositions of Good and Brophy (1987), ignored and under-evaluated misconduct when it was rare and infrequent and had limited influence on class learning. When confronted with negative conduct, teachers coped with troublemakers by appealing to brief verbal and non-verbal hints and gestures without having had to stop the lesson overflow. Teachers encouraged students to devise self-discipline mechanisms to allow themselves to watch their behavior and to adapt it to proper manner and good standards. Teachers also fostered desirable conduct, discouraged wrongdoings and kept promoting creative types of behavior.

Science-Technology-Society (STS)

The integration of society, science, technology and environment into the students' every day needs presented the learning unit not only as a sheer exciting material but also as a significant necessity. Indeed, students perceived the significance of the learning unit both on the personal and social levels as reflected in the boost of their motivation. Consequently, it is suggested that the learning curricula in the field of sciences should be designed in a way that is certain to bring about a noticeable increase in student motivation to study the contents and acquire the skills offered. This was obtained in a number of methods. Defining learning goals versus performance goals, to start with, was of a great help. The learning unit was carefully designed that it advanced students who regarded their academic achievement as their first priority. Far from encouraging students who paid attention only to their performance, the learning unit and those who implemented it, i.e. the teachers, promoted students who were always attentive to all interactions in the class, considering their assignments as a tool that doubled their learning benefits and perception realizing that learning was a process that demanded unremitting efforts, constant alertness and persistent work. Students who are interested only in performance goals give close attention to their learning behavior in presence of the mates and thus remain distant from realizing the meaning of the tasks that are intended to make the acquisition of new skills easier. Worse, these students exert themselves less than their counterparts and therefore fall beyond their teachers' expectations. Hence, teachers' encouraging learning motivation must take priority over motivating students to focus on performance and achievement.

Binding subjects to students' present and future needs was another necessary and useful way of fostering motivation. Once students identified the great fitness of learning subjects for their own (present and future) needs and professional aspirations as well as interests, their internal motivation mushroomed and they grew more attracted to learn a particular subject. Similar assertions were reported by Maher and Madgely (1991), who think that students are more willing to learn a class subject only when the need for it is really felt and truly lived. In view of this, teachers and educators can emphasize the crucial role of social studies and current

events in decision making, to have an example, and can give the students the opportunity to recognize how class subjects do assist students in coping with every day life.

The more students recognize the importance of learning science subjects and realize their practical applications in the every day life, the more students can learn about their importance to society and students' motivation is increased, as a result. Perhaps here lie the reasons why numerous studies emphasize the necessity to focus on social, scientific and practical problems when teaching the subject of science and to use practical and scientific contents derived from the every day life (Bybee, 1987; Yager, 1990; McGarth, 1994; Aikenhead, 1994; Lazarowitz, 2000; and Mistler-Jakson and Songer, 2000).

Summary

This study has confirmed that the teachers' use of different teaching/learning strategies, and their choice of contents can satisfy the students' needs and are so meaningful that students can see the integration of society, science, technology and environment subjects into the students' every day life, are perfect guarantees for students' motivation increase. In addition, they ease the teachers' task of creating a classroom environment where students are actively engaged in all classroom activities, performing their assignments with pleasure and fun. In this educational climate students are immune against all types of distracters; nothing can limit the teachers' power to benefit the learners in isolation from discipline problems and non-productive manners, so students cannot but learn.

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