FACTORS AFFECTING TEACHING THE CONCEPT of RENEWABLE ENERGY in TECHNOLOGY ASSISTED ENVIRONMENTS AND DESIGNING PROCESSES in THE DISTANCE EDUCATION MODEL

A. Seda YUCEL

**Hacettepe University,
Faculty of Education,
Department of Chemistry Education,
Ankara, TURKEY**

ABSTRACT

The energy policies of today focus mainly on sustainable energy systems and renewable energy resources. Chemistry is closely related to energy recycling, energy types, renewable energy, and nature-energy interaction; therefore, it is now an obligation to enrich chemistry classes with renewable energy concepts and related awareness. Before creating renewable energy awareness, the factors thought to affect such awareness should be determined. Knowing these factors would facilitate finding out what to take into account in creating renewable energy awareness. In this study, certain factors thought to affect the development of renewable energy awareness were investigated. The awareness was created through a technology-assisted renewable energy module and assessed using a renewable energy assessment tool. The effects of the students' self-directed learning readiness with Guglielmino (1977), inner-individual orientation, and anxiety orientation on the awareness were examined. These three factors were found to have significant effects on renewable energy, which was developed through technology utilization. In addition, based on the finding that delivering the subject of renewable energy in technology assisted environments is more effective, the criteria that should be taken into consideration in transforming this subject into a design model that is more suitable for distance education were identified.

Keywords: **Renewable energy; renewable energy awareness; module; technology-assisted education; distance education; distance education models.**

INTRODUCTION

The need for energy, which will meet the requirements of today's increasing population and which will also adapt to the present capacity of industrializing, stands before the danger of not being able to be supplied by the limited energy resources of the earth. By the growth of the shortfall between production and consumption of energy, and environment pollutant characteristics of the traditional energy production methods, in addition to the fact that these energy sources will come to an end have all added up to the requirement of investigating alternative energy resources. Therefore, national energy policies highly focus on sustainable energy systems and renewable energy resources. Renewable energy resources are defined as "the sources of energy that can integrally exist the next day within the self evolution of the nature".

Here, the issue under question is obtaining energy from an energy flow that is inherent in the self evolution of the nature, and that is continuously regenerated. Accordingly, the "renewable energy" concept should be adopted by communities and they should be informed on the activities held on this subject. It has been an

important requisite also on the part of the individuals to assume an awareness of renewable energy, regarding its properties and areas of use. Individuals in certain educational levels, should be included in the process of creating awareness according to their age groups. Lately, interdisciplinary studies on the concept of renewable energy (Muma *et al.*, 1996; Rowland, 1980; Crelinsten, 1983; Theis, 1982; Sarvis, 1980; Energy Foundation, 1992; 1990) and its unitary teaching in relevant educational levels, the support for it (Crummet,1996; Hehn and Newport, 1991; Backler, 1984; Brophyand Fryars, 1983; Wilson and Krasnow, 1983 ; Anderson and Botinelli, 1981; Nicholson, 1996; Allen *et al.*, 1981) and supplying these processes in technology assisted environments are among the factors affecting the creation and development of the awareness of renewable energy.

Environmental awareness and the concept of energy emerge as a current issue in natural sciences education, too. Many branches of natural sciences such as Physics, Chemistry, and Biology are concerned with the nature, characteristics, species, and areas of usage of energy as well as its effects on the environment and recycling. Because of its subject matter, the science of chemistry poses specific importance in creating renewable energy awareness since it has close relations with energy conversions, energy regenerations, types of energy, and interactions with nature. Technology assisted modules have been proven to play a positive role in developing the awareness of Renewable Energy by a process of cooperation via interdisciplinary issues or in establishing it by teaching it as a separate unit in relevant educational levels.

It is considered essential to study weather the factors like readiness of the individuals by self-motivation and the influence of their anxieties and personal factors regarding their motivation are effective or not in creating this awareness, as well as determining up to what extent technological environments affect these factors. It is already known that technology assisted education equips the students with enriched information and an ability to control its efficiency (Kommers, 1996).

In such an educational perception, the target should be established so as to determine the factors that will make differences on creating the awareness for the students. Studying the effectiveness of readiness and some other motivation-orientation factors that acts as a predictor in creating the renewable energy awareness by technology assisted modules and in increasing this awareness significantly will reveal how important the circumstances in establishing these factors creating the awareness are. Motivation forces an organism for some specific reactions which consequently lead to learning things. It is found that without a particular reason, one does not tend to develop an interest directed to learning. It is also found that individuals learn more quickly about the subjects they are interested in and which they find appealing. On the other hand, it is not possible to have all individuals motivated at the same level regarding any one issue. Motivation is found to impact between 16% to 38% part of a student's level of acquiring success. Thus, motivation, affected by some factors regarding the environment of creation of awareness, has profound effect on assuming awareness by preparing technology assisted modules about renewable energy. With motivation, the individual signals specific reactions, as a result of which learning is achieved.

Motivation helps the student to get ready to learning. It is found that orientations formed according to the different characteristics of individuals play a key role in assuming the state of motivation. Orientations are tools of measuring which comprise of sentences targeting to measure the existing situation according to the subject to be motivated about, and which determine how the positive or negative characteristics of the individual relate to learning of the mentioned subject. It is found that in the process of learning a specific subject, the choice and usage of these measuring tools that will support establishing of motivation most effectively will also

have important uses in the assessment of the effectiveness of learning environments (Ames, 1990b; Schunk, 1991; Mc Manus, 2000; Martin, 2001; Watson, 2004).

In the process of learning the concept of renewable energy and establishing awareness, and before and after learning with technological support, measuring the personal characteristics and concerns, which are considered to have an effect on motivational attributes that facilitate creation of renewable energy awareness, is studied, and the issue of whether these characteristics contribute to awareness creation is also dwelt upon.

On the other hand, in the process of the change of the rapidly globalizing world, the former education system, where the students used to receive the readymade information and joined the learning process passively, is replaced with the new education system where the students participate in the learning process actively, and where they investigate the relationships between the reasons and the results, and finding methods of solutions to the problems by applying the information that they have learned previously to newer circumstances. The main principle in the self-learning process of the students regarding the issue of renewable energy is enabling the students to assume responsibilities and to improve themselves individually (Özlerbaş, 2003). In order for a subject to be taught in technology assisted environments, first of all, students should assume this responsibility and they should be individuals who already have a self-learning ability.

Having determined this requisite to be a measurable ability, Guglielmino (1977) developed a readiness scale with level determining features and have performed many applications of this scale on various subjects (Newsom, 1977; Torran and Mourad, 1978; Mourad, 1979; Beitler, 2000). Determination of the contribution of the use of technology in learning readiness by self-direction in learning the renewable energy subject and in the process of creating awareness has profound importance in revealing the other factors which are considered to be impacting the development of renewable energy awareness, and in professing a conclusion about it.

THE SIGNIFICANCE of THE STUDY

Choosing the subject of renewable energy in this study on chemistry education bears a particular significance. The world is going through a rapid process of globalization. In this process, the boundaries among different sciences are also rapidly disappearing. In other words, for any issue under consideration, it is getting harder to state whether it is a matter of chemists, physicists, biologists, shortly natural scientists, or social scientists. So long, many of the subjects have been considered as interdisciplinary. Creating awareness among individuals about renewable energy, at the first look, seems to fall into the study areas of chemists or environmental chemists, however, it is an interdisciplinary issue related to many study areas. Therefore, the studies carried out on this issue will also contribute considerably to various disciplines.

In addition, transforming this issue to a design model appropriate for distant education model will increase its educational properties as well as making it effective on a much greater sampling.

THE PURPOSE OF THE STUDY

Certain factors considered to have effects on teaching the subject of renewable energy are investigated within the scope of this study. The effect of students' self-direction readiness (Guglielmino, 1997) and motivation in technologically assisted

ways of learning the subject of renewable energy are investigated. As a motivational effect in learning a subject, Anxiety Orientation Sentences developed by Morgil et al. (2005), which signify anxiety related attitudes, and Personal orientation sentences developed again by Morgil et al. (2005), which signify personal motivation, are dealt with as predictors, and while investigating the effect of these factors in developing awareness in technological environments, their relevant meaningfulness to each other is tested and results are compared, as well as developing suggestions for adapting a class on this subject to distance learning models.

METHOD

In this study, the increase in the self-learning ability of the students about the renewable energy subject obtained by previously provided information and research on the internet, and the increase in their level of knowledge on the renewable energy subject are determined. Application studies of candidate teachers are conducted in two groups. The reason for this is facilitating the environment for the students to utilize the maximum efficiency out of computers as there were not sufficient computers for each student. The organization is made so as to offer one computer for every two students, thus facilitating furthermore the cooperation, which plays an important role in self-learning. Volunteer students, who speak the English and German languages and who have internet access at home, participated in the study. The number of students was kept limited as area studies require in depth and detailed definitions, and detailed investigations were carried on chosen students.

The students in the study group were chosen among the ones who have taken their area courses and who have GPA's of 2.5 or higher (on a scale of 4). In the interviews made with all the students, it is determined that all of them have at least beginner level experience and skills on using the internet.

The students studied the "Renewable Energy" subject on the web as a web based course and presented their homework assignments by collecting information over the internet and submitting project assignments and reports. Those students with hesitations or problems regarding using the internet have been informed beforehand in the courses held by the lecturers observing the implementation.

Multiple observers (three lecturers and four research assistants joined the observations) were used in this study in order to secure internal validity, and multiple methods were employed (observation, interview, document analysis, evaluation of pre-post knowledge tests) in order to verify the accuracy of the findings. In addition, by returning to the sources for the results found out in the interviews, the findings used in the study were tested for whether they were being reflected in conformity with the truth.

The results obtained in each step were discussed with expert persons on educational subjects, and the comments of these persons regarding the findings were recorded. By using more than one data collection and analysis methods in the study, reliability, as well as internal validity were attained.

SAMPLING

47 candidate teachers are participated in the study. And also, volunteer students, who are speak the English and German languages and who have internet access at home, and participated with the study. 23 of the candidate teachers are females and 24 of them are males. The number of students was kept limited as area studies require in depth and detailed definitions, and detailed investigations were carried on chosen students.

The students in the study group were chosen among the ones who have taken their area courses and who have GPA's of 2.5 or higher (on a scale of 4). Multiple observers (three lecturers and four research assistants joined the observations) were used in this study in order to verify the accuracy of the findings. The results obtained in each step were discussed with expert persons on educational subjects, and the comments of these persons regarding the findings were recorded.

MEASUREMENT TOOLS

- **The "Renewable Energy Awareness Scale" developed by Morgil, Yucel, Secken, and Goktas (2004), for which validity and dependability analysis were carried out, was used as the assessment tool in pre- and post test activities. The scale used in the study comprises of 39 sentences and the alpha internal consistency coefficient is found to be 0.994. The scale has the properties of a Likert type 5 level grading scale.**
- **The Anxiety Orientation Scale developed by Harlen (2003) and changed with some additions later on, which consists of 16 sentences and have a confidence rate of 0.8856 and which is used in measuring anxiety related attitudes and motivation in learning a subject is applied. The scale has the properties of a Likert type 5 level grading scale.**
- **In pre-and post test studies, Personal Orientation Scale developed by Harlen (2003) and changed with some additions later on, consisting of 16 sentences and having a confidence rate of 0.9084 which is used in measuring personal tendencies and motivation in learning a subject is applied. The scale has the properties of a Likert type 5 level grading scale (Annex 3).**
- **In assessments of learning readiness by self-direction, the scale developed by Guglielmino (1997) was used. The scale was designed as result of a 3-round Delphi study containing 14 experts who have experience on the issue of self-direction. The reliability coefficient of this scale is calculated as 0.87. In this study, it is applied in order to reveal how learning readiness by self-direction regarding the subject of renewable energy results in specific environments, and to determine whether it has relationships with other independent variables.**

IMPLEMENTATION

In the implementations, the concept of renewable energy is taught in a technology assisted environment through a three-week intensive course and with the help of the tools prepared for it. Before teaching the renewable energy concept with technology support, the Renewable Energy Awareness Scale, the scale of student readiness to learn by self-direction, the anxiety orientation scale, and the personal orientation scale were applied as pre-test, and as post-test after the intensive course. The significance between the pre and the post test and the effect of the applied assessment tools on creating awareness were measured and determined by the help of specific statistical methods.

FINDINGS

Dependant variable t-test results conducted in order to determine in what extent the internal orientation scale, the anxiety scale, renewable energy awareness scale, and the self-direction learning readiness scale applied to the students have changed before and after the implementation are presented in Table: 1. As it can be seen from Table 1, significant results are visible in favor of the post-test in a comparison between the pre and post test averages of the scales. This result shows that the applied implementation has effects on the readiness of the students, in increasing their awareness, an in changing their anxiety and internal orientations. As seen in

Table: 1, significant decrease in anxiety is observed after the implementation performed.

Table: 1
Pre-Post Test Results of the Applied Scales

	Mean	Std. deviation	T	Df	Sig.(2-tailed)
Internal pre-test average –Internal post-test average	-,383	,492	-5,328	46	,000
Anxiety pre-test average –Anxiety post-test average	1,789	,591	20,743	46	,000
Readiness pre-test average– Readiness post-test average	-21,00	15,298	-9,411	46	,000
Awareness pre-test average– Awareness post-test average	-13,51	11,82641	-7,832	46	,000

The study also aims to inform the students on the concept of renewable energy by the technology assisted educational activities carried on with the students and clarifying any imperfect and incorrect information they have.

After achieving this aim, an explanation was tried to be brought out regarding the prediction of awareness by the assessment tools applied in order to quantitatively test whether an increase in the awareness has really taken place in the students. The results are presented in Table 2.

Table: 2
Regression Analysis Results on the Factors Affecting Student Success

Variable	B	Standard deviation$_B$	B	t	p
(Constant)	6.179	,705		8,761	,000
RT 2	-2,193E-03	,002	-,163	-1,167	,250
INNER 2	-4,830E-02	,097	-,071	-,500	,619
ANXI 2	-,417	,155	-,379	-2,692	,010

It can be seen from Table 2 that all three independent variables are meaningful predictors of renewable energy awareness. The mathematical regression equation explaining the renewable energy awareness is as below.

Renewable Energy Awareness = 6.179-2.19E-03 Readiness-4.83E-02 Internal Orientation-0.417 Anxiety Orientation

As it can be seen from the results in Table 2, it has been determined that all the three independent variables have the rate of describing the renewable energy awareness as 10.07%.

DISCUSSIONS AND CONCLUSION

In this study on the effectiveness of teaching the concept of renewable energy in the internet environment, the effect of self-learning readiness, personal orientation, and anxiety orientation which are considered to contribute to the development of Renewable Energy awareness in a technological environment are investigated. It can be stated that a technology based education develops, makes easy, and accelerates the self-learning abilities of students. Again if we look at the pre and post tests of the survey made up of the sentences, describing the attitudes illustrating own personal abilities, which is called as "internal orientation", it is observed that the individuals have developed their ability of personal skills by using technology.

The results of T-test conducted regarding the subject reflect an increase in favor of the post test (Table 1). Learning by using technology increases the awareness of the students, advances their self-learning abilities, strengthens their internal-personal orientations, and decreases their anxieties.

It is already known that lecturing methods of the subjects in chemistry classes and the choice of teaching environments have very significant effects on learning. Teaching of subjects in chemistry classes, lately by using technology, shall be successfully carried on in consideration of specific characteristics of the students as well as the conditions of the class environment and the teacher's inclination to the subject.

These characteristics shall be determined in the most efficient manner when the performance of the students is taken into account in addition to their view of the subject of the class. As a method, self-learning and self-evaluation of students are considered very important in modern evaluations.

When computer environment is used in line with the aim, it is determined to be positively developing self-learning. While conducting self-learning in the process of education, students should establish the aims relating to the subjects that they are supposed to learn together with the observers who will supervise them, plan the necessary activities to reach these aims, determine their level of development corresponding to their established aims, and cooperate in the stage of collecting reliable information. Teaching the concept of renewable energy with technology support is determined to impact the orientational and motivational characteristics of the individual positively, to develop the self-readiness and to decrease the anxieties.

Moving on from this point of view, if the design and teaching method of the subject is prepared in an effective way, it shall be successful in those distant education environments, which have been in the agenda after widespread use of internet in technological settings. Distance Learning implies "formal, institutionally based educational activities, where the teacher and learner are normally separated in time, and where two way interactive telecommunication systems are used for the sharing of video, data, and voice instruction" (Burke, 1998; Boschman, 2003).

Distance education has become a very popular mode for providing education to students, who would not other wise, be able to take courses. Historically, distance education has taken many forms, most of which involve a work-at-your-own-pace philosophy.

Modern fiber-optic communication technology permits much more sophisticated distance education formats, including ones that mirror very closely a traditional classroom situation. Several states have begun to implement and test various distance education curricula using this technology. Many studies in a wide variety of subject areas have analyzed many modes of distance education. In general, the results of these studies show that distance education works as well as traditional methods of instruction. Unfortunately, studies comparing distance education methods are inherently confounded by the inability to randomly assign learners to groups (Kurtz, 2001).

The design of a distant education course on the internet is a resultant of objectivist and constructivist education paradigms (Szabo, 1999). Consequently, in order for the model on renewable energy to attain success, the contents of the course need to be prepared according to the needs and the characteristics of the students (Passerini, 2000). In order for the concept of renewable energy to be constructed successfully as a model in the distant education platform, it needs to go through the stages of Analysis, Design, Development, Evaluation, and Publication.

In the Analysis stage, content enrichment based on the analysis of the target population needs to be done before teaching the concept of renewable energy.

In other words, this points out to knowing the informative, social, physical and personal characteristics of the students. As informative characteristics, general tendency towards technology, functional-visual literacy, computer literacy, learning styles, and readiness regarding the contents may be cited.

As for the personal characteristics, the motivation to learn in a computer environment, interest and attitudes towards the concept of renewable energy, anxieties, and attitudes towards using technology may be cited.

In the study, the teaching of the concept of renewable energy in the internet environment is found to have positive effects on various characteristics determined as informative and personal characteristics (Reeves, 1993).

As social characteristics, career, educational level, attitudes towards cooperation, socio-economical level, and as physical characteristics, audio-visual abilities of the student, age, sex, etc. characteristics should be taken into account (Karakuzu, ...).

In the Design stage, the strategy preferred for the teaching of the concept of renewable energy should be planned. At this point, the teacher who will conduct this class shall undertake important responsibilities. The artistry in arranging the lecture on the web, and creation of the most effective environment for the students to use are among the issues to be tackled at this stage.

In the Development stage, the necessary environment should be organized in order to teach the concept of renewable energy class broadcasted over the internet as a distant education class. Various interaction possibilities should be designed and presented in order to keep the interest of the students active.

Student interaction should be ensured by sending multiple messages of student's choice, containing materials (of lecture slides, video displays, etc.) regarding the concept of renewable energy. In the evaluation stage, formative and portfolio evaluation can be performed.

This is a stage that should be practiced in order to obtain feedback on the criteria of teaching of the concept of renewable energy. These evaluations should be applied throughout the delivery of the course.

In the stage of Publication, the distribution of the teaching on the concept of renewable energy takes place. This stage is related to the results that the students reach in the environments where the teaching of renewable energy is conducted. At his stage, a successful presentation of the subject to the students is important.

This is also the stage where the designers do self criticisms regarding the preparation and the cost of the issue. The positive effect of the internet environments on developing some specific characteristics of the students shall be increasingly effective and meaningful when this subject is taught in distant education environments.

In the design process of the concept of renewable energy as a web based distant learning class, it will be possible to teach this current subject in a more successful and popular platform provided that the education designers do not underestimate the qualities explained above.

BIODATA and CONTACT ADDRESSES of AUTHOR

Assist. Prof. Dr. Aysem Seda YUCEL was born in Ankara at 12.09.1969 and graduated Department of Chemistry, Faculty of Education, at Hacettepe Universiy at 1991.

She is working at the Department of Chemistry, Faculty of Education, at Hacettepe Universiy, since 1994.

Assist. Prof. Dr. Aysem Seda YUCEL
Hacettepe University, Faculty of Education,
Department of Chemistry, Faculty of Education,
06800 Beytepe/Ankara, Turkey
Tel: 0 312 297 67 83
Email: aseda@hacettepe.edu.tr

REFERENCES

Allen et all. (1981). *A Project to Develop an Associate of Science Degree Curriculum in Renewable Energy Research and Applications in Agriculture*, Final Report, July1-June30.

Ames, C. (1990b). *Developing a Learning Orientation*. Paper presented at annual meeting of the AERA, Boston, 16-20 April.

Ames, C. (1992). Classrooms: Goals, Structures and Student Motivation, *Journal of Educational Psychology*, 84(3), 261-271, EJ 452395.

Anderson and Bottinelli (1981). *Something Special for Teachers. A Schoolhouse Energy Teaching Program*, USA, Texas.

Backler (1984). *Energy and Economics for the Elementary Grades, Unit, I (Grades K-6), Lessons and Activities for the Elementary Grades*, USA; Indiana.

Beitler, M. A. (2000). Self-Directed Learning Readiness At General Motors Japan. Report, 17p. Erıc Document. ED 447 266.

Boschman, E (2003). Teaching Chemistry via Distance Education, *Journal of Chemical Educaiton*, V:80, N:6, 704-708.

Brophy and Fryars (1983). *Conserving Our Energy; Teacher and Pupil Booklets*. Unit:11, Seychelles Integrated Science; Seychelles.

Burke, K.A; Greenbowe,T.J (1998). Colloborative Distance Education: The Iowa Chemistry Education Alliance, Journal of Chemical Education, V: 75, N: 10, 1308–1312.

Crelinsten, M. (1983). *Environmental Awareness and Appropriate Technology*, OPCAN, Montreal (Quebec).

Crummett (1996). *Introduction to Natural Resources, Multistate Academic and Vocational Curriculum Consortium.*

Deci, E.L. and Ryan, R.M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior* (Plenum, New York).

Deci, E.L., Koestner, D. And Ryan, R.M. (1999). A Meta-Analysis Review Of Experiments Examining The Effects Of Extrinsic Rewards On Intrinsic Motivation, *Psychological Bulletin*, 125, p627-688.

Guglielmino, L. M. (1977). Development of the Self-Directed Learning Readiness Scale. (Doctoral Dissertation, University Of Georgia, 1977). *Dissertation Abstracts International, 38*, 6467A.

Harlen,W; Crick,D.R. (2003). Testing and Motivation for Learning, *Assessment in Education*, v10, n2.

Hehn and Newport (1991). *Introduction to Natural Resources*. Teacher Edition, USA; Oklahoma.

Kommers, P.A., Grabinger, S., Dunlop, J.D. (Ed). (1996). *Hypermedia Learning Environments: Instructional Design and Ixitegration*. Mahwah, NJ: Lawrence Erlbaum Associates.

Kurtz, M; Brandt, H (2001). Analysis of Distance-Education Program in Organic Chemistry, Journal of Chemical Education, V:78, N:8, 1122-1125.

Marsh, H.W et al (2003) "Evaluation of the Big Two-Factor Theory of Academic Motivation Orientations: An Evaluation of the Jingle- Jangle Fallacies, Multivariate Behavioral Research, V:38, N:2, P:189-224.

Martin, A. (2001). School Motivation Of Boys And Girls: Differences of Degree, Differences of Kind, or Both?, *Australian Journal of Psychology*, v 56, n3.

Mc Manus, T. F. (2000).Individualising Instruction in a Web-based Hypermedia Learning Environment: Nonlinearity, Advance Organised, and Self-regulated Learners, *Journal of Interactive Learning Research* 11, 219-251.

Morgil, I., Secken, N., Yucel, A. S, Oskay, O and Goktas, A. (2005). An Examination of Awareness Scale Prepared On the Subject of Renewable Energy, European Variety in Chemistry education Congress, 4-7 July, Krakow .

Mourad, S. A. (1979). Relationship of grade level, sex, and creativity to readiness for self-directed learning among intellectually gifted students (Doctoral dissertation, University of Georgia, 1979). *Dissertation Abstracts International, 40,* 2002A.

Mumma, T; Shaun,G; Stone,L; Harnish, C; Fowle, A. (1996). *Building Our Children's Future: An Interdisciplinary Curriculum for Grades K-12*, USA, Montana.

National Energy Foundation (1990).*Teach with Energy! Fundamental Energy, Electricity, and Science Lessons for Grades K-3*, USA; Utah.

National Energy Foundation (1992). *Teach with Energy! Fundamental Energy, Electricity, and Science Lessons for Grades 4-6, USA*; Utah

Newsom, R. (1977). Lifelong learning in London. 1558–1640. Lifelong Learning: *The Adult Years,* 1(4), 4–5, 19–21.

Nicholson, (1996), *Class Projects on the Internet; Education in Science*, n 170, 10-11.

Ozlerbas, M. A (2003).” Bilgisayar Destekli Baglasik Ogretimin Ogrenci Basarisi, motivasyonu ve transfer becerilerine etkisi” Ankara Universitesi Egitim Bilimleri Enstitüsü Egitim Bilimleri ABD Egitim Programları ve OGretim (Egitim Teknolojisi) Programi Doktora Tezi.

Passerini,K.; Granger, M. (2000). A Developmental Model for Distance Learning Using the Internet. *Computers and Education*, 34, 1-15.

Reeves, T.C. (1993). Evaluating interactive multumedia. In D.M. Gayesky, *Multimedia for learning: Development, application, evaluation*. Englewood Cliffs, NJ: Educational Technology.

Rowland, P. (1980). *Influencing Teaching: An Inside View of an Outside Interest Group*, USA; New Mexico.

Sarvis, R. (1980). *Energy Management Technician Curriculum Development. Final Report*, USA, Washington.

Schunk, D. (1991). Self-Efficacy And Academic Motivation, *Educational Psychologist*, 26, p207-231.

Szabo,M., and Kanuka,Hl (1999). Effects of violating screen design principles of balance, unity, and focus on recall learning, study time, and completion rates. *Journal of Educational Multimedia and Hypermedia*, 8(1), 23-42.

Theiss, N and Others. (1982). *K.E.E.P.-Kentucky's Energy Education Program Activities for the Classroom, K-6*, USA, Kentucky.

Torrance, E. P., & Mourad, S. (1978). Some Creativity and Style of Learning and Thinking Correlates of Guglielmino's Self-Directed Learning Readiness Scale. *Psychological Reports, 43*, 1167–1171.

Watson,M; McSorley, M, Foxcroft,C and Watson, A. (2004). Exploring The Motivation Orientation and Learning Strategies of First Year University Learners, *Tertiary Education and Management*, 10:193-207.

Wilson and Krasnow (1983*). Science Study Skills Program: People, Energy and Appropriate Technology. Student Text,* USA, Virginia.