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Exploring the Relationship Between Students' Knowledge and Perception Towards Sustainable Agriculture

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Abstract

This study determines the relationship between students' knowledge and their perceptions towards sustainable agriculture. 100 senior agricultural students from 10 different majors at the University of Tehran were selected by simple random method. A 10-point scale was used to measure students' perceptions and knowledge towards sustainable agriculture. The validity was confirmed by a panel of experts and the scale was subjected to reliability testing using data collected in the pilot study. The Cronbach alpha coefficients were 0.62 and 0.86 for the scales of perception and knowledge, respectively. Students rated themselves as a group having limited knowledge of sustainable agriculture policy but high for their attitudes, especially for environment and livelihood (security food). The findings revealed that attitude dimension of environment and food security, and the knowledge dimension of practice and sustainable agricultural systems had specifically a greater role in determining relationship between students' attitudes and their knowledge towards sustainable agriculture. Overall, to enhance students' attitudes towards sustainable agriculture, it is suggested that more attention be paid to the concepts of policy determination and familiarize students with sustainable agriculture in agricultural curriculum development.

Keywords: knowledge, perception, sustainable agriculture, student.

واکاوی روابط بین دانش و نگرش دانشجویان نسبت به کشاورزی پایدار

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چکیده

هدف این مطالعه تعیین ارتباط بین دانش و نگرش‌های دانشجویان نسبت به کشاورزی پایدار بود. پاسخگویان ۹۹ نفر از دانشجویان سال آخر کارشناسی ۱۰ رشته در دانشکده کشاورزی دانشگاه تهران بودند. پرسشنامه‌ای با مقیاس طیف ۱۰ درجه‌ای برای سنجش ارتباط بین نگرش‌ها و دانش دانشجویان در ارتباط با کشاورزی پایدار استفاده شد(از ۰ تا۱۰). دانشجویان دانش خود را در باره سیاست‌های کشاورزی پایدار محدود ارزیابی نمودند. اما نگرش مناسبی به ویژه در ابعاد محیط زیستی و معیشتی (امنیت غذایی) نسبت به کشاورزی پایدار ابزار نمودند. یافته‌ها نشان داد که ابعاد محیط زیستی و امنیت غذایی نگرش با ابعاد فعالیت‌ها و نظام‌های کشاورزی دانش کشاورزی پایدار دارای سهم بیشتری در ارتباط بین دانش و نگرش دانشجویان نسبت به کشاورزی پایدار می‌باشند. و بالاخره این که، برای ارتقای نگرش دانشجویان نسبت به کشاورزی پایدار پیشنهاد می‌شود که توجه بیشتری به ابعاد سیاست‌گذاری کشاورزی پایدار در برنامه‌های آموزشی مبذول گردد.

کلید واژه‌ها: دانش، نگرش، کشاورزی پایدار، دانشجویان.

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Introduction

Agricultural students have to prepare to become agriculturists who will pass on knowledge to future generations through teaching and practising the principles acquired at educational institutions (Udoto and Flowers, 2001). Aldo Leopold (1949), perhaps the best know crusader of what has emerged as sustainable agriculture, believed in education as an effective tool for building a well-informed society that is able to make intelligent decisions concerning good management of the land. He said to his students at the University of Wisconsin: "I am trying to teach you that this alphabet of 'natural objects' (soil and rivers, birds and beast) spell out a story, which he who runs may read if he knows how. Once you learn to read the land, I have no fear of what you will do to it, or with it. And I know many pleasant things it will do to you". (Aderemi and David, 2001). According to Ajzen (2005), students' and parents' personal experiences, observations, knowledge, and values about agriculture affect their attitudes about agriculture, which in turn affect their beliefs. May (1969) concluded that people base their perceptions on past experience and knowledge; therefore, if a person has limited knowledge and experience about a topic, then he or she cannot accurately perceive it (Duncan, 2004). In this regard, since issues relating to the structure of agriculture, the environment and sustainable development have emerged as important contemporary areas of debate within and outside of agriculture, discussion of these issues is likely to receive increasing attention by agriculture and natural resource related professions well into the 21st century (Dennis *et al*., 1998). In accordance with this, the purpose of this study is to identify students' knowledge and perceptions of sustainable agriculture, as well as to identify the knowledge weaknesses of students and deliver some suggestions for addressing them.

Objectives

Regarding the purpose of this study, namely to identify students' knowledge and perceptions of sustainable agriculture, the following specific objectives are followed:

- Identify the demographic profile of the respondents
- Determine the knowledge of sustainable agriculture profile of the students
- Assess the attitude of the students toward sustainable agriculture
- Explore the relationship between perceptions and knowledge towards sustainable agriculture.

Sustainable Agriculture

Sustainable agriculture is a journey rather than a destination. The word "sustainable" comes from the word "sustain" which means to maintain, support, or to endure. It is the complexity of this multi-dimensional concept. From the difficulties evident in gaining a consensus on the definition, it is obvious the term has different meanings for different people. For example, the American Society of Agronomy defines sustainable agriculture as one that, over the long term: (1) enhances environmental quality and the resource base on which agriculture depends, (2) provides for basic human food and fiber needs, (3) is economically viable, and (4) enhances the quality of life for farmers and society as a whole (Betts *et al.*, 2004).

One of the most comprehensive definitions of sustainable agriculture was given in the 1990 Farm Bill:

> The term sustainable agriculture is an integrated system of plant and animal production practices having a site-specific application that will, over the long-term, satisfy human food and fiber needs; enhance the environmental quality and natural resources base upon which the agriculture economy depends; make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate natural biological cycles and controls; sustain the economic viability of farm operations; and enhance the quality of life for farmers and society as a whole (Williams,2000).

Knowledge of Sustainable Agriculture

The role of scientific knowledge has been emphasized for sustainable agricultural development. The concept of precision agriculture, based on information technology, is becoming an attractive idea. It is an umbrella terminology which embraces scientific knowledge (such as agronomic science) and its practical expression (machines, treatments, procedure, tools, supplies) (Sparovek and Schnug, 2001). Maohua (2001) argues that the key restriction of less agricultural development and less food production in developing countries is the backwardness of agricultural sciences and technology (Rezaaei-Moghadam *et al.*, 2005). The concept of an "ecological knowledge system" was introduced by Roiling and Jiggins (1998) in response to a need for a knowledge system to transform the agricultural paradigm. The ecological knowledge system fundamentally different from a knowledge system to support conventional agriculture. The ecological knowledge system should evolve along with changes in values and policies. In this regard, Betts *et al.*, (2004) asserted that practices, systems and policy are all knowledge dimensions of sustainable agriculture**.** Sustainable agricultural systems are those which are able to maintain their productivity, stability and equilibrium in the face of stress or shock indefinitely into the future. Ecological relationships can be used to make agricultural systems more sustainable, for example, agroforestry (mixed plant/tree associations), and intercropping, rotations, green manuring, biological pest control and integrated pest management. A shift in the agricultural value system should result in a more conducive sustainable agricultural policy.

Realization of sustainable agriculture depends on policy and planning at international, national, and local levels. Influential policies such as globalization, free market, trade and also impact of agricultural practices on human health and the role of environmental movements needs to be considered in sustainability planning (Rezaei–Moghaddam *et al.*, 2005). Practices are actions we take to achieve goals. Why don't we define sustainable agriculture in terms of practices? There are two important reasons: First, we expect that our knowledge will increase in the future, so practices used now may not be considered the best practices ten years from now. Second, the effect of a practice can vary enormously depending on how and where it is performed. Practices of sustainable agriculture are found in the concepts that underlie integrated pest management, low-input sustainable agriculture, rotational grazing, ecological agriculture, waste management, organic farming, and alternative agriculture.

Perception Towards Sustainable Agriculture

The primacy of values and attitudes is shifting the agricultural paradigm can not be questioned. Attitude has been defined as the predisposition to feel, think or act in a particular way (Fakoya, *et al.*, 2007). An attitude is (a) directed towards an object, person, institution, or event; (b) has evaluative, positive or negative, elements; (c) is based on cognitive beliefs towards the attitude-object (i.e., the balancing between positive and negative attributes of an object leads to an attitude); and (d) has consequences for behavior when confronted with the attitude object (Bergevoet *et al.*. 2004). Attitude simply refers to ‘‘a person’s evaluation of any psychological object’’. These value judgments are represented as items of knowledge, which are based on three general classes of information: cognitive information, emotional information, and information about past behaviors (Allen *et al.*. 2003). In regard to sustainable agriculture, Williams and Wise (2001) stated three dimensions - social, economic and environmental - for sustainable agriculture and, on this basis, developed their scale including 16 items to measure perceptions towards sustainable agriculture. They found that teachers valued sustainable agriculture only if the practices were profitable and perceived that farmers would only

use practices that were economically sound. Less value was placed on the environmental and social dimensions of sustainable agriculture. Karami and Mansoorabadi (2007) have also determined attitudes toward sustainable agricultures as values and feelings of concern for sustainable agriculture, and the motivation for environmental improvement and protection as a model has been developed to explain farmers' attitudes and behaviour toward environmental sustainability. Beus and Dunlap (1993) advanced that concerns for humankind, the community, and nature are important elements of the new sustainable agriculture paradigm. Ultimately, regarding implemented researches, as Betts *et al*., (2004) stated, sustainable agriculture dimensions are social, economic, environmental and related to quality of life which formed the basis on which a scale was developed to explain students' attitudes toward environmental sustainability

Theoretical Framework

We acknowledge that agricultural systems are human systems, so that 'what is sustainable' will also be value-laden. Agricultural systems are distinctive in that changes in values and attitudes of farmers, managers and other stakeholders (students), and externally imposed risk (e.g., climate) interact (Karami, and Mansoorabadi, 2007). Since awareness is a prerequisite to all changes, changes in values and attitudes are a consequence of awareness. Without strong dissatisfaction with "conventional agricultural paradigm" and favorable values and attitude towards a sustainable agricultural paradigm," no paradigm could be realized. If this assumption does not hold, all other efforts seem to doom to failure (Rezaaei-Mogahdam *et al.*, 2005). A survey conducted by Chizar *et al.* (1999) in Iran showed that the success of sustainable agriculture depends on the motivations, skills, and knowledge of individual agents. Therefore, access to information and the type of information received are fundamental contributors towards attitude formation. Knowledge and information bring confidence, skills, ability and experience. If stockholders such as students believe that it is easy for them to perform, then they are likely to engage in the behaviour (Karami and. Mansoorabadi, 2007). Thus, a correlation between student's knowledge and attitudes toward sustainable agriculture is assumed. In this regard, it is used the theory of Reasoned Action that was pioneered by Azjen and Fishbein in 1975. It is a model of the psychological processes that mediate observed relations between attitudes and behaviour (Willock *et al.*. 1999). This theory argues that demographic variables, knowledge and observations influence beliefs, which influence attitudes, intentions, and finally behaviors. As such, relationships between of knowledge dimensions and attitude components are studied.

Research Methodology

This study was conducted to assess the knowledge, and attitude of senior students and the relationship between them. For this purpose, the study utilized a descriptive survey design to accomplish the objectives and all agricultural senior students from the agricultural colleges of Tehran University were included as potential participants for this survey. 100 senior students of agriculture were selected randomly from 250 senior students and were interviewed using a questionnaire. The questionnaire used a 10-point scale to measure students' perceptions on 21 items related to sustainable agriculture. Another scale measured the students' knowledge on 17 items related to sustainable agriculture. Answers were coded from 1 (no or little knowledge and attitude when no or wrong answers were given) to 10 (good knowledge and attitude). In addition, some demographic data were collected for the purpose of describing the respondents. Demographic characteristics of each group were

similar in terms of their age, years in their professional area, area of agriculture and gender. As suggested by Tuckman (1978), agricultural students at Tehran University who were familiar with sustainable agriculture practices and agricultural education programmes reviewed the instrument for content and face validity and judged to be valid. The selection of the panel of experts was based on knowledge of agriculture, and research methods. The Cronbach alpha coefficients for perceptions and knowledge regarding sustainable agriculture were 0.62 and 0.86, respectively. Data analysis was carried out on a computer mainframe using the Statistical Package for Social Science (SPSS). Descriptive and inferential statistical treatments such as percentages, means, standard deviations, and canonical correlation were applied to the data.

Finding and Discussion

Participant Characteristics

The results indicated that the average age of the respondents was 24.93 years. Nearly half (40.4.8%) of the responding faculty members had a BSc. degree. Of those responding, 89% were male and 11% were female. More than half of the respondents (n = 99, 67.68%) had farming backgrounds. The average number of years of experience was 3.69 years.

Attitudes of Students

The data in Table 1 show the means and standard deviations for the 21 attitude statements presented based on mean scores. The 5-point scale was interpreted as: 1 – 2.49 = strongly disagree; 2.50 – 4.49 = disagree; 4.50 – 6.49 = neutral, 6.50 – 8.49 = agree; and 8.50 – 10 = strongly agree. As the findings in Table 1 show, 2 of the 21 statements had means considered as "strongly agree" 10 had "agree" ratings, 5 had "neutral" ratings, 4 had "disagree" ratings, and none rated "strongly disagree". Two of the statements with the highest means were related to environmental degradation, as indicated by means of 8.66 and 8.74. These issues were related to sustainable agricultural practices that help in environmental protection and balance. Students agreed with 10 of the items, as indicated by means between 6.50 and 8.4 including their beliefs about sustainable agriculture and their perceptions about advantage of sustainable agricultural practices in reducing the use of chemical fertilizers, potential of pest control methods in the long-term, leading their lives more in harmony with nature, food security, farms with both crop and livestock enterprises and that advocates of sustainable agriculture have an anti-farmer attitude. Thus, students appear to be unsure of McIsaac's (1996) view that sustainable agriculture has the potential to enhance the quality of life for farmers and society as a whole and also conservation of environment. Students were also "agreed" about the importance of adopting appropriate technologies and implementing management beyond conventional practices in sustainable agriculture. Thus, management becomes more important as farmers consider environmental and social factors along with the economic dimension in their farming operations. Students were "neutral" with five of the items, as indicated by means between 4.50 and 6.49. Statements related to sustainable agricultural practices, the most efficient use of non-renewable resources and on-farm resources and economic gains of employing sustainable agricultural practices. Students disagreed with four of the items, as indicated by means of 3.74, 3.53 and 3.84. These matters were related to the farmers' lack the knowledge and motivation for implementing sustainable agricultural practices and the recommended practices in sustainable agriculture not embraced by mainstream agriculture. There was a high degree of variability among students on this issue as indicated by the lower 3.18 standard deviation for item 4.

Table 1- Means and standard deviations for the attitudes of students towards sustainable agriculture.

Components of sustainable agriculture	Items	Mean	Sd
Enhances environmental quality and the resource base on which agriculture depends	1. Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.	6.06	2.798
	2. Recommended pest control methods for sustainable agricultural systems have potential for more pests in the long term.	7.13	2.248
	3. Sustainable agricultural practices (e.g. soil conservation, integrated pest management, decreased use of fertilizers and other chemicals, etc.) help protect the environment and our natural resources.	8.66	1.579
	4. Environmental balance is one basis for sustainable agricultural practices	8.74	1.626
	5. An advantage of sustainable agricultural practices is reduction in the use of chemical fertilizers.	8.19	1.828
	6. Farmers in sustainable agriculture lives more in harmony with nature.	7.62	2.093
Satisfy human food and fiber needs.	7. Sustainable agricultural systems should produce an adequate food supply to feed the world population.	7.20	2.420
	8. Adoption of sustainable agriculture practices will be easier for farmers who have both cropped and livestock enterprises.	6.74	2.248
	9. Sustainable agriculture practices would work well on any farm.	4.82	2.593
Sustain the economic viability of farm operations.	10. Adoption of sustainable agriculture will inevitably involve losing money.	4.97	3.108
	11. Economic gains when employing sustainable agricultural practices are not Convincing. 2	5.37	3.012
	12. Net farm income may decrease when a producer implements sustainable agricultural practices	4.40	2.721
	13. Recommended sustainable agricultural practices are not new and only need refinement to increase profit and protect the environment.	6.73	2.318
	14. Sustainable agricultural systems can improve income on a farm.	6.72	2.205
	15. There may be insufficient labor for the workload required in sustainable agricultural systems.	6.36	2.668
enhances the quality of life for farmers and society as a whole	16. Sustainable agriculture means going back to what our grandparents did or involves adopting appropriate technology.	6.80	3.094
	17. Sustainable agricultural practices may require additional management beyond conventional practices.	7.67	2.090
	18. Advocates of sustainable agriculture practices do not have 19. an "antifarmer" attitude	8.31	2.558
	20. The adoption of sustainable agricultural practices is slow because farmers lack the knowledge to implement them	3.74	3.180
	21. The slow rate of adoption is due to lack of motivation among farmers	3.53	2.719
	22. Recommended practices in sustainable agriculture have not been embraced by mainstream agriculture.	3.84	2.633

Table 2- Knowledge of sustainable agriculture practices as perceived by students.

Knowledge level of Sustainable Agriculture	Items	Mean	Sd
Sustainable Agricultural Systems	1. Community-based food systems (e.g., local markets for local production)	4.61	2.791
	2. Establishing farmer-to-farmer information networks	6.13	2.564
	3. Paying attention to Natural process instead off-farm inputs.	7.38	2.054
	4. Developing multicultural instead Monoculture	5.02	3.127
	5. Integrated agricultural systems (Agrofarestry, cropping management. Water and soil management , intercropping and…)	7.96	2.095
Sustainable Agricultural Policy	6. Support of market prices.	7.75	2.149
	7. Enhancement conservational production technologies by direction payments	6.92	2.853
	8. Reduction of inputs prices	6.65	2.685
	9. Provide of government services such as extension services.	7.65	2.274
	10. Provide tax exemption for farmers in sustainable agriculture	7.48	2.347
Sustainable Agricultural Practices	11. Sustainable agriculture decreases soil erosion because of less use of tillage.	7.23	3.374
	12. Conservation tillage practices that reduce soil erosion and conserve water.	5.87	2.429
	13. Animal production systems that emphasize disease prevention.	6.04	2.604
	14. Crop rotations that reduce weed, disease, and pest problems.	6.93	2.172
	15. Integrated pest management practices that reduce the need for pesticides.	7.68	1.984
	16. Crop rotations that increase soil nitrogen and reduce the need for purchased fertilizers.	7.21	2.111

Students' knowledge of Sustainable Agriculture

Table 2 reports the means and standard deviations for level of knowledge in three broad areas pertaining to sustainable agriculture (practices, systems, and policy) based on mean scores. The 5-point scale was interpreted as: 1 – 2.49 = not informed; 2.50 – 4.49 = slightly informed; 4.50 – 6.49 = moderately informed; 6.50 – 8.49 = well-informed; and 8.50 – 10.00 = highly informed. As shown in Table 2, agricultural students in the study, as a whole, reported they were beyond the moderately informed category for each of the items regarding sustainable agricultural areas identified. The findings revealed that, in the systems area, students are relatively well-informed on the items of integrated agricultural systems, paying attention to natural process instead off-farm inputs and establishing farmer-to-farmer information networks. The results for their level of knowledge in the policy area pertaining to sustainable agriculture indicate that in items of supporting of market prices, providing government services and providing tax exemption for farmers in sustainable agriculture, students have adequate knowledge or are well-informed. The data in Table 2 also show that the mean scores for the practices are above "moderately informed" in all of items. However, students in none of the topics have a mean score at the "highly informed" level. They also score well in topics such as integrated pest management, soil erosion control, and reduced usage of chemicals and fertilizers. Finally, students in terms of crop rotations that reduce weeds, disease and pest problems and animal production systems that emphasize on disease prevention and conservation tillage practices have a "moderate informed" level.

Relationship Between knowledge level and Attitude level of Students Related to Sustainable Agriculture

Table 2 indicates three functions (three pairs of variates) were derived yielding various canonical correlation scores. The null hypothesis tested was that all squared canonical correlations (R 2c(s)) equaled zero. The Wilks Lambda test was significant at the first squared canonical correlation %= 0.01. The null hypothesis was rejected, indicating that the (R (1)) was statistically significant. Following the 10% rule of thumb (Thompson, 1984; Warmbrod, 1987), the remaining squared canonical correlation coefficients (R 2c(1) = 0.091; R 2c(3) = 0.008;) were less than 0.10 and were not considered meaningful. In addition, the F statistic revealed that Rb (2), and R2c (3), were not statistically significant and thus were not interpreted.

Standardized Canonical Coefficients

Canonical weights (standardized canonical coefficients) were used as indices of the relative importance of a variable to the canonical variate (function). The researcher selected the variables which indicated a relatively high coefficient in relation to the other variables within a given function. Table 4 indicates that for the criterion variable set, satisfying human food and fiber needs was the most important for Canonical Variate 1. For the predictor variable set, practices, systems and policy were relatively important for Function 1.

Table 3- Canonical correlation analysis.

Function	*Eigen value*	*Canonical correlation*	*Squared Canonical Correlation*	*F Test*	*P*
1	.51	.58	.341	243.70	**.000**
2	.13	.302	.091	186.00	**.055**
3	.008	.091	.008	94.00	**.676**

Wilks Lambda = .5783, F = 4.30,(df 12,282), p=.000.

Table 4- Relationship between students level of knowledge and attitude level o related to sustainable agriculture (n = 91).

Functions *Variables*	*1*	*2*	*3*
Criterion Variable Set			
Environment	.18	.93	**.38**
Satisfy human food and fiber	.93	.35	**.28**
Economic	.12	.29	**.64**
Quality of Life	.129	.34	**.51**
Predictor Variable Set			
System	.49	.85	**.27**
Policy	.116	.40	**.99**
Practice	.744	.77	**.22**

Structure Coefficients

The structure coefficients which can be interpreted as factor loading are a product-moment correlation between the original variables in each set and the canonical variate scores for a given canonical variate (functions). The rule of thumb (Thompson, 1984; Warmbrod, 1987) is to treat as meaningful structure coefficients which are equal to or greater than 0.30. The magnitude of the structure coefficients were interpreted following guidelines established by Chuatong (1987). The interpretations were: 0.25 or lower = Low; 0.25 to 0.64 = Moderate; and, 0.65 or greater = High. On the criterion variable set, satisfy human food and fiber ((0.96) loaded highest on Canonical Variate 1. Of the predictor variable set, practice (0.85), system (0.62), and policy (0.36) loaded highest on Canonical Variate 1.

Conclusion and Recommendations

Respondents rated themselves as having appropriated attitudes of sustainable agriculture, rating 10 out of the 16 perception statements as "agree". The ratings for their beliefs about sustainable agriculture were especially high for environmental, food security and social dimensions, but less so for the economic aspect. Similar thoughts regarding sustainable agriculture were observed among Iowa farmers (Dyer, 2000; Williams, 2000). Thus, it is concluded that presenting an environmental theme to agricultural students resulted in the areas of strongest support for sustainable agricultural dimensions. Students rated themselves as having appropriated knowledge of the sustainable agriculture area; their knowledge about sustainable agriculture, rating 12 out of the 16 knowledge statements as "well informed" agreed with Betts *et al.* (2004), who reported an adequate or excellent level of knowledge of sustainable agriculture among extension educators. Student respondents were most knowledgeable in the area of sustainable agriculture systems about integrated agricultural systems concepts and were least knowledgeable about the community-based food systems concepts. Student respondents were most knowledgeable about integrated pest management concepts and were least knowledgeable about the conservation tillage practices of the practices concepts area. In the policy concepts area, student respondents were also most knowledgeable about support of market prices and state services concepts and were least knowledgeable about reduction of inputs prices concept.

Therefore in accordance with Williams (2000) and Williams and Wise, (1997), it is concluded that students' belief that sustainable agriculture has the potential to have a positive impact on agriculture provides a foundation for additional learning. On the basis of students' belief that sustainable agriculture has the potential to influence environmental, social, and economic dimensions of agriculture, and

Table 5- Correlations between dependent and canonical variables.

Functions / *Variables*	*1*	*2*	*3*
Criterion Variable Set			
environment	.43	.82	**.35**
Satisfy human food and fiber	.96	.077	**.25**
Economic	.084	.15	**.78**
Quality of Life	.099	.46	**.55**
Predictor Variable Set			
System	.62	.69	**.35**
Policy	.36	.085	**.92**
Practice	.85	.47	**.091**

curriculum specialists and teachers can develop teaching and learning opportunities where students can expand their knowledge of sustainable agriculture practices, especially about: community-based food systems, developing multiculture and conservation tillage and animal production systems. Also, based on the findings, the attitude dimensions of the environment and food security, and the knowledge dimension of practices and systems of sustainable agriculture have a greater share in determining the relationship between attitudes and knowledge of students towards sustainable agriculture. Therefore, it is concluded that students' attitudes are based on environment and likelihood concerns because they have a higher awareness related to conservation practice and are unaware of economic and social dimensions in sustainable agriculture frameworks. And so, for enhancing attitude of students toward sustainable agriculture, it is important to give more consideration to concepts of policy determination and familiarizing students with sustainable agriculture in the curriculum development of agricultural education institutes, agreeing with Fretz (1991) that "thinking" is embedded in sustainable agriculture. In this regard, the Center for Integrated Agricultural Systems (CIAS) of University of Wisconsin Madison (2007) asserts the curriculum has to build on inter-related concepts and combines practical, in-the-field knowledge with a scientific understanding of:

- soil management and conservation
- crop physiology
- livestock production
- integrated pest management
- agro-forestry
- human nutrition
- community food systems

In addition to course work and in order to put the student's knowledge and attitudes into practice, CIAS recommends a few experiential learning opportunities as extracurricular activates such as community supported agriculture, (e.g., on-farm research and demonstration plots, featuring sustainable agriculture practices could enhance learning for students (allowing students to develop the knowledge that will help them realize the potential they see in sustainable agriculture) and internships (in local, national, or international settings and generally lasts for up to three months that enables students to apply the knowledge gained from your degree program in a professional environment and strengthen your career opportunities).

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