

## PROFESSIONAL EXTENSION SUPPORT: A PREREQUISITE FOR SUSTAINABLE IRRIGATION DEVELOPMENT

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### ABSTRACT

*This paper presents an overview of the concepts profession, professional and professionalism and reflects on the general perceptions for professional extension support in irrigation management perceived by small- scale and commercial irrigation farmers. It also portrays the findings on the assessment of the technical competence and knowledge of irrigation extensionists. Possible barriers why irrigation extensionists often lack to do their work in a professional manner are discussed. A discussion of several recommendations that might help to restore the self-esteem of individuals and improve the service delivery of the irrigation extension profession concludes the paper.*

### 1. INTRODUCTION

South Africa is a water stressed country with an average rainfall of 500mm. A narrow region along the southeastern coastline receives more than 600 mm rainfall, while the western and greater part of the interior of the country is arid or semi-arid. Sixty five percent of the country receives less than 500 mm rain per year, which is usually regarded as the minimum for rain fed farming (DWAF, 1994). Agriculture is by far the largest user (59%) of the 13 911 million m<sup>3</sup> water available (DWAF, 2002). Although global warming and climate change impact on water availability, the human impact on the earth's environment and climate

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must be addressed in order to protect a county's water resources (Diouf, FAO, 2007).

In South Africa the revitalization of irrigation and irrigation management transfer is an accepted policy (Backeberg *et al*, 1996). Implementation of this policy and the Millennium Development Goals set for South Africa to address poverty in 2015 can however not succeed without professional extension support. In the process of integrated rural development, the extension agent acts as an essential link between government and rural communities. Interaction is nowadays much more group oriented and extensionists act as a facilitator or catalyst with regard to farmers' personal development. In both cases professional extensionists perform an important function to promote agricultural development, which in turns lead to community development.

The objectives of this paper are to start by providing an overview of the concepts profession, professional and professionalism as described in the literature. The second part of the paper reflects on the general perceptions for professional extension support in irrigation management as perceived by small-scale and commercial irrigation farmers. The third part of the paper discusses possible barriers why irrigation extensionists often fail to provide a professional extension service to farmers. Lastly, recommendations are made how to restore the self-esteem of individuals and improve service delivery of the irrigation extension profession.

## **2. PROFESSIONALISM UNDER THE MICROSCOPE: UNDERSTANDING OF THE CONCEPTS PROFESSION, PROFESSIONAL AND PROFESSIONALISM**

In general the way we as extensionists walk, look, talk, act and work determine whether we are professional or an amateur. It is important that extensionists should develop a frame of mind that whatever they do, they are doing it as a professional and move up to professional standards in it. Professional extensionists are important links in the competitive and sustainable farmer-customer supply chain - they are not amateur dabblers.

If one uses the term professionalism, there are different interpretations with regard to the concept. Whether you mow lawns, managing a store, help farmers or farm yourself; there are common job-characteristics that define any working person as a true professional. The biggest misperception today about professionalism is probably the notion that earning of a big salary makes you a professional. It however, takes much more than compensation to make someone a professional.

The slippery and contested nature of the term “profession” is generally agreed (Callahan, 1988; Freidson, 1994). In describing its elusiveness in the context of land use planning, Grant (1999) notes its use as a synonym for “accomplished” or “qualified”, and the opposite of “amateur”. Freidson (1994) however refers to a “common sense” idea of professionalism effectively labelling particular occupations as in the same way superior to others. A profession according to the Oxford English Dictionary is “an occupation, requiring advanced knowledge of some discipline of learning and special training”, while a job is “a piece of work to be done or either completed.” Knowledge standards for membership are determined; standards of behaviour in application of that knowledge are set and means for developing knowledge - both of individual practioners and the totality of that knowledge are established by the professional institution (Fellows, 2003). Profession therefore refers to a job with an intellectual character (Düvel, 1990). The major elements of a profession are: philosophy, body of knowledge, leadership, guidelines for behaviour, and admission requirements.

A member of a profession is termed a professional. A professional according to the Oxford English Dictionary is “a person who follows an occupation applying the special conventions, forms of politeness associated with a certain profession.” However, professional is also used for the acceptance of payment for man activity like sport, in contrast to an amateur.

Professionalism is therefore exhibited by the professional character or spirit or methods that mark or qualifies a profession, and distinguished it from an amateur. Professionalism is a matter of attitude and behaviour (Steyn & Stevens, 2002). It embraces not just knowing how to do your job, but also demonstrating a willingness to learn, cooperate and get well with others, showing respect, and living up to your commitments. There is some agreement in the literature over what

might constitute a set of common characteristics of professionalism. Following Bayles (1988) and Carr (2000), five principal characteristics of professionalism can be identified:

- (1) extensive training which comprises a significant intellectual component and involves theoretically as well as practically grounded expertise;
- (2) the provision of an important public service;
- (3) an organisation of members and a process of licensing and regulation of practice;
- (4) a distinct ethical dimension which calls for expression in a code of practice; and
- (5) a high degree of professional autonomy in one's work.

One aspect that is implied with professionalism, implicit or explicit, is for professionals to demonstrate accountability. Those who are members of a specific organization or profession are held accountable for what they do. To become professional in your task as an extensionist, it is like other life skills, which you learn; you do not just become a "professional" overnight.

### **3. METHODOLOGY**

Data was collated and analyzed between 2000 and 2004 during a study where the aim was to identify factors which influence the adoption of irrigation scheduling practices on the farm (Stevens, *et al.*, 2005). The research was undertaken in various provinces of South Africa and comprised three phases:

- A quantitative assessment conducted on a national basis amongst 332 irrigation schemes in South Africa, provides an overview of the distribution and implementation of on-farm irrigation scheduling methods amongst commercial and small-scale irrigation farmers.

- Semi-structured interviews conducted with several small-scale irrigation farmers and key informants on the small-scale irrigation schemes throughout South Africa.
- A random sample of 134 commercial irrigation farmers from eight different provinces (Northwest, Eastern Cape, KwaZulu Natal, Western Cape, Limpopo, Northern Cape, Free State and Mpumalanga) was interviewed with the aim to determine possible human factors and constraints that impact on the adoption of on-farm irrigation practices.

This study was followed by a second quantitative assessment of a stratified sample of 109 irrigation extension officers from KwaZulu Natal, Eastern Cape, Limpopo, Northwest and Mpumalanga provinces working on small-scale irrigation schemes conducted in 2006, to determine their technical competency, knowledge and training needs with regard to irrigation management.

#### 4. PERCEIVED ATTRIBUTES FOR PROFESSIONAL EXTENSION SUPPORT

In South Africa 387 extension workers employed by mainly provincial departments of Agriculture are involved in serving small-scale and commercial irrigation farmers (Stevens & van Heerden, 2005). Commercial and small-scale farmers were asked to identify the most important competencies perceived for credible and effective irrigation extension delivery that may indicate their professional stance.

Table 1 reveals the perceived attributes of irrigation extensionists critical for the delivering of a professional extension service:

- The first qualification farmers expect of irrigation consultants and extensionists is *experience and competency in irrigation management* (42%). The irrigation extensionists/consultant must be able to display both a proper educational training as well as practical skills in irrigation management. Farmers require a specific “knowledge profile” of irrigation extensionists important for efficient extension delivery.

**Table 1: Percentage distribution of farmers' perception of most important attributes of irrigation extensionists perceived for effective extension delivering (N=134)**

Attributes of irrigation consultants	Number of respondents (n)	% Respondents
1. Technical competence	56	42
2. Affordable support service	54	40
3. Timely, focused and accurate information	47	35
4. Integrity, credibility, trustworthiness and commitment	38	28
5. Preparedness to learn from each other	26	19
6. Practical recommendations appropriate for specific context of application	24	18
7. Ability to interpret measured data and communicate effectively	18	13
8. Availability, empathy and interpersonal sensitivity of consultant	15	11

The advent of on-farm computer irrigation scheduling and the use of sophisticated scheduling devices like neutron probes, etc. necessitate the use of appropriate computer software, which resulted in external support from irrigation consultants and extensionists to make the information valuable for decision-making. Competency in computers alone without appropriate knowledge and understanding of irrigation management and general agricultural production, are inadequate for more informed decision-making.

- *Timely, focused information (35%)*: In general, there is an expectation that the irrigation extensionists or advisor should have access to the newest information and irrigation technology. Farmers expect of them to be able to comprehend the bigger or holistic picture of the industry and to keep the farmer informed about the appropriateness of an innovation for a specific farming system.
- *Integrity, honesty and credibility (28%)*: Irrigation advisors and extensionists are expected to be fair, unbiased, maintain confidentiality, avoidance of practices that are not in the interest of the client and be reliable. Farmers want to have trust and confidence in the practices of the extensionist. Credibility is often regarded as a

combination of trust, competence and integrity usually developed over time between a client and an extensionist.

- *Preparedness to learn instead of teaching (19%)*: Advisors and extensionists should be prepared to learn from each other as well as from farmers. No one knows everything about every subject. Extensionists should have an open-minded willingness to listen, observe and interpret what farmers are saying. Often extensionists are inclined to impose or push the information upon the irrigation science-management divide.
- *Understanding the context (18%)*: It is important that the irrigation extensionist or advisor must be well informed about tendencies and the latest developments of the specific industry. Extensionists must have a good system and product knowledge and be abreast of emerging trends. They are responsible for recommendations that are adapted to the specific farming system and management style of a farmer, but also reconcilable with the social norms and values as applicable for the specific farming community.
- *Ability to interpret measured data and communicate effectively (13%)*: One of the frustrations that farmers experience with many irrigation extension and consultancy services is the fact that many of their consultants/irrigation extensionists lack the ability to interpret irrigation data they have measured. Providing information alone without contextualizing it is perceived to be relatively ineffective for farmer's decision-making.

Furthermore, farmers perceived it of utmost importance that advisors and consultants understand the various learning preferences of farmers. Respondents indicated that the manner in which the measured data and information required for irrigation management is presented and packaged for a specific farm, will only be effective if a specific business context and desired outcomes of the farmer are taken into account.

- *Availability, empathy and interpersonal sensitivity (11%)*: The general availability of advisors/extensionists in identifying needs and problems of clients as well as offering support to farmers with appropriate information for decision-making are important

perceived traits for efficient extension delivery. Farmers expected extensionists to be able to listen attentively and then respond humanely to their concerns. This requires respectfulness when dealing with people involved in a change process, openness and honesty about one's intentions, and commitment to help farmers with problem solving on the farm.

These qualities perceived by irrigation farmers for effective service delivery reveal both sound technical competency as well as leadership skills. Extensionists should be able to serve the irrigation farmer with the best technical information available for a specific on-farm situation, but also build strong relationships with farmers over time where parties trust and honor each other. Abraham Lincoln once said, "If you would like to win a man to your cause, first convince him that you are his sincere friend".

## **5. IMPEDIMENTS TO PROFESSIONALISM IN IRRIGATION EXTENSION**

The following four impediments may prevent irrigation extensionists to move forward as professionals.

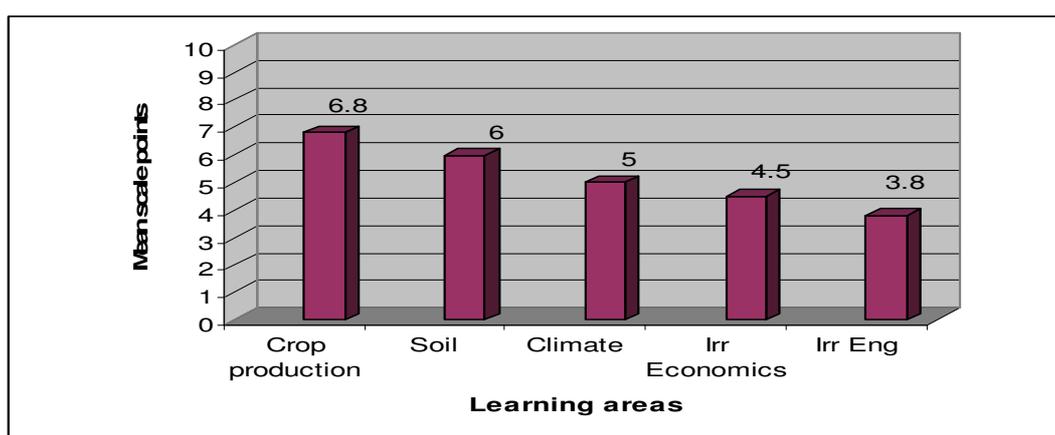
### **5.1 Technical knowledge and competence level of irrigation extension workers**

Professional extension practitioners are important links in the competitive and sustainable farmer-to-customer supply chains. Commercial and small-scale irrigation farmers identified the need for irrigation extensionists to be adequately trained in the technical aspects of his work and have a good working knowledge on the main learning areas of the agricultural system in which he works. The irrigation extensionists should exist of a workable knowledge and competency in the following areas namely crop production, soil science, irrigation water management, agro-climatology, irrigation economics, irrigation engineering and extension for effective intervention with irrigation farmers.

Knowledge according to Van der Horst and McDonald (1997) is regarded as information, data, facts, theories and concepts that have been contextualised and which is used by learners to clarify and

understand logic, sequences and relations. The mean technical knowledge assessment of extension workers by themselves using a ten-point semantic scale (where 1=extremely low knowledge level and 10=extremely high knowledge level) was used with regard to the following learning areas identified as part of the required “knowledge profile” of an irrigation extensionist:

- Crop production or agronomy aspects (crop growth and water requirements, sensitivity of different crops, general crop management requirements)
- Soil (cultivation practices, physical and chemical characteristics of soil, irrigation potential, water holding capacity, etc.)
- Use of agro climatic data (ET<sub>o</sub>, evaporation figures, rainfall, temperature, humidity, etc.)
- Irrigation economics (drafting and interpretation of enterprise budgets, compiling and preparing of business plan for irrigation farming, calculating and interpreting of irrigation operational costs, etc.)
- Irrigation engineering (maintenance of irrigation systems, delivery rate of water sources, monitoring of system efficiency, etc.)

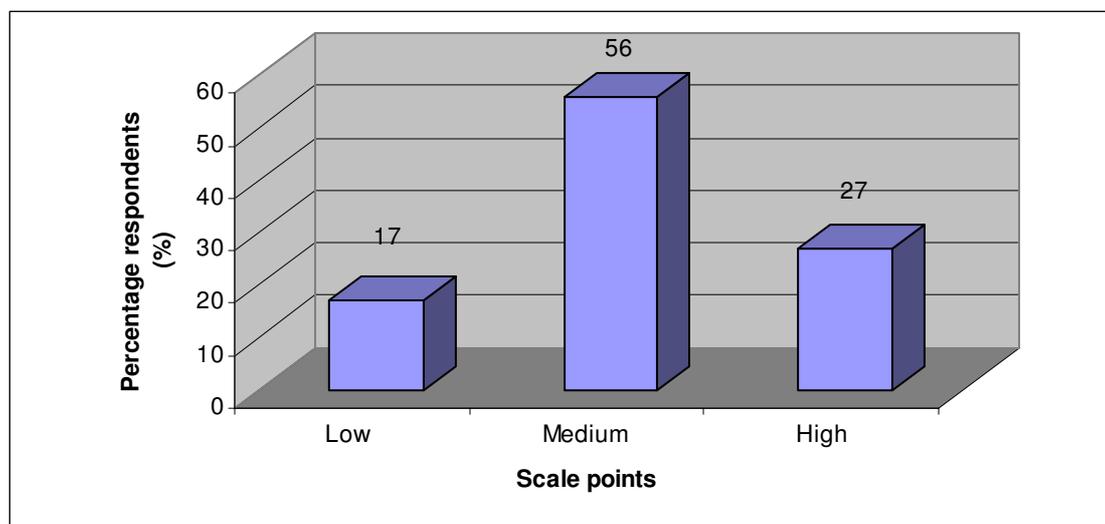


**Figure 1 Mean knowledge assessment of extension workers by themselves of different learning areas of importance in irrigation management using a 10-point semantic scale (N=83)**

The findings in Figure 1 portray that extension officers are in general satisfied with their knowledge levels regarding the learning areas crop production, soil science and use of agro climatic data (with a mean score of 5 points on the 10-point semantic scale and higher). However, with regard to the learning areas irrigation economics and irrigation engineering, extension workers perceive their knowledge level inadequate, and therefore an indication of realisation among respondents that they require more knowledge. Perhaps this is a modest indication and not necessarily a realistic indication of the shortfall of the technical knowledge required, but it emphasises the need for an appropriate knowledge support system. Bembridge (2000) revealed that more than 50% of the extension officers from the Eastern Cape and KwaZulu/Natal working on irrigation schemes, perceived a need for further training in irrigated crop production, irrigation water management and farm economics. The respondents in general were satisfied with their knowledge regarding agricultural extension, since 47% of the respondents perceived they had specialised knowledge and skills in agricultural extension.

Competency of extensionists in irrigation management is based on what an extensionist can accomplish and the ability to perform an actual occupational role, which requires integration of knowledge, skills and value orientation. Figure 2 shows the competency assessment of irrigation extensionists regarding rendering assistance with irrigation management decisions using a 10-point semantic scale (where 1 = extremely incompetent and 10= highly competent).

The findings in Figure 2 portray that 83 % of the respondents perceived themselves competently enough to render effective extension support to irrigation farmers. This perceived self-efficacy is interesting if compared with the critical shortcomings in technical knowledge identified (Figure 1). This is perhaps an over optimistic perception of their competency level to give advice on irrigation water management and not necessarily a realistic indication of the shortfall perceived by irrigation farmers.



(10-point semantic scale for competency in irrigation management with: Low level = 1-3 scale points; Medium level=4-6 scale points; High level = 7-10 scale points)

**Figure 2: Extensionists' perceived competency assessments on irrigation management using a 10-point semantic scale (N=109)**

## 5.2 Formal training curricula offered by tertiary institutions

An assessment of current educational curricula in irrigation management offered to agricultural students by tertiary institutions revealed that the majority of the training institutions tend to concentrate on single disciplines, where the agricultural scientist or technician is usually found to be thoroughly trained in only one of the required disciplines, whilst other required learning areas like irrigation water management, irrigation economics and engineering are usually included as a part of a curriculum to a limited extent. The main concern is that the majority of tertiary training institutions often succeed to produce students specialised in a specific field of agriculture, but are most of the time lacking to build capacity amongst learners regarding a trans-disciplinary approach (problem-orientated learning) needed for professional irrigation extension delivery.

One facet of training in irrigation management that is often ignored is developing of appropriate human and social learning skills required for efficient irrigation extension delivery. It is important to have insight and an understanding of who the stakeholders are from a viewpoint of

alignment, inside and outside the farming context. This can only be acquired through appropriate training in agricultural extension or similar training. Numerous examples of failed irrigation development projects in third world situations, especially in Africa, have been recorded. In most of these cases the lack of success could be related to an ignorance of local traditions, social norms, political structures and a lack of researched needs assessment (Morris & Thom, 1990).

Secondly, the traditional training and educational approaches used by the majority tertiary institutions mainly dwell on acquainting students with foundational competence (demonstrating an understanding of the theoretical knowledge and thinking underpinning the action taken) and provide little room for learners to develop practical and reflexive competence (ability to integrate performances and decision making to adapt to change) through the inclusion of experiential learning as described by Kolb (1984). Reflective practices are not commonly embedded in personal habits and organisational requirements (Macadam *et al.*, 2004). Notwithstanding the perceived benefits of experiential learning for students to stimulate “triple loop learning” through integrating theory with practice, instilling and sustaining this method of training is perhaps more easily said than done.

### **5.3 Failing to pursue a personal plan for Continuous Professional Development (CPD)**

Early extension workers, who were dedicated, highly trained and highly capable by standards of their day, earned our present reputation as extensionist in large part. The same situation must prevail by today’s standards if extension is to continue as a highly significant unit of our society. No one ever knows everything there is to know, especially if you look at the rapid rate of change in agriculture. Even if you could know everything today there will be gaps in your knowledge tomorrow. The professional extensionists should continue to seek opportunities for systematic maintenance, improvement and broadening of knowledge and skills through continuous learning throughout one’s working life. Every opportunity for the improvement of knowledge and understanding in connection with the professional duty contributes to the development of personal qualities necessary for the execution of professional and technical duties required from the extensionist. The motivation for continuous learning lies in the first

place with individual, who demonstrates professionalism, in part through his willingness, commitment and motivation to continuous professional development (CPD).

Table 2 illustrates the interest and attitudes of irrigation extension workers towards one aspect of CPD to ensure capability namely, the attendance of short courses in irrigation management, where experiential learning is also deployed in the training programme.

**Table 2 Percentage distribution of attendance of short courses in irrigation management by extension workers (N=109)**

<b>Short courses as source of knowledge support</b>	<b>n</b>	<b>%</b>
Yes	31	28.5
No	77	71
No response	1	0.5
<b>Total</b>	<b>109</b>	<b>100</b>

Only 28.5% of the irrigation extensionists attended short courses in irrigation management that were offered, of which 33% were extension supervisors or managers responsible for supervising and supporting field extension staff. A tendency exists that extension workers involved with more sophisticated irrigation systems (36%) like sprinkler, centre pivot and floppy irrigation systems are more prepared to attend short courses in irrigation management than extension staff involved in furrow irrigation (16%).

According to Meyer and Mokoele (2001) training entails the transfer of specific skills to an individual to perform specific tasks. Learning is mainly promoted where links exist between the subject matter and problem area confronted by the target learner group (Kilpatrick, 2000). The relative low attendance of short courses could also be ascribed to the mismatch that exists regarding the training needs (content and /or the format of training material) between irrigation extensionists and training facilitators.

#### **5.4 Professional accreditation**

Ethics and professionalism are integrally linked with each other. Professional associations and regulatory bodies are given legislative

authority to enforce standards and define protocols for the delivery of professional services. Professional codes of practice or conduct are contracts entered into by members of a professional institution, which form the legally, enforceable requirement for the behaviour of members (Pojman, 1995). Stewart (1995) notes that such codes “do not teach morality, ethic or values, they lay down rules for conduct and, unless they are used in a positive manner as a basis for teaching principles, they will in daily practice be no more than guidelines for action.”

For some years the South African Irrigation Institute (SABI) provides professional irrigation engineers and designers the opportunity to register with them. The goals of this institute are as follows:

- To award SABI designer status to irrigation designers that meets a recognised level of competence and has completed the SABI National Examination for designers. These designers are bound by SABI ethical code to the designing of irrigation systems, which meet the design norms.
- SABI also promotes, coordinates and applies applicable norms, standards and guidelines for the manufacturing of effective and affordable irrigation equipment.
- Through effective communication SABI promotes cooperation between all role-players and interested parties.
- Promotion of effective and applicable training of people in irrigation involved in the irrigation industry (short courses, etc)
- Promotion of development of appropriate standards for the award of qualifications to, and the professional certification of persons concerning their expertise and experience in the respective disciplines in irrigation.
- Promoting of professional interest of SABI members within the SABI mission and vision.
- Acceptance of ethical professional code of conduct by all SABI members and the application of disciplinary steps if necessary.

A major shortcoming regarding the training programmes offered by SABI is the fact that it is not accredited with the South African Qualification Authority (SAQA).

You need a licence to be a plumber or an electrician but anyone can be an irrigation consultant or extensionists. Currently there is no prescribed qualification, peer assessment, nor requirement for continuous professional development of irrigation consultants and extensionists responsible for rendering support to farmers. Therefore, no clear market signals for the farmer exist that the one-irrigation extensionists or consultant is better than another. This occurs largely by word-of mouth or by measures of reputation. Even then, the farmer has no benchmark by which he or she can judge that the irrigation extensionists are abreast of current technology and best practice. There is no signal that there is adherence to a code of ethics nor of appreciation to manage production and environmental interaction. This has led to the current disquiet regarding the lack of control over who can set up and provide irrigation consultancy and extension advisory services. Professional accreditation and development programme will benefit the farmer, the irrigation extensionists and consultant as well as the market in general.

## 6. CONCLUSION AND RECOMMENDATIONS

The evolutionary capacity of professional bodies and individuals may be very different. In their analysis of public sector professionals, Laffin and colleagues (1998) consider how different professions seek to adapt to changing client environment and identified four professional species:

- the *conservers*: who are resistant or hesitant to change
- the *prospectors*: inspirational professionals who risk new claims and recruiting members
- the *advocates*: new and highly active professionals
- the *passive professionals*: transfixed in the bright headlights of change

Professionalism is not restricted to a certain profession; it is a behavioural construct, which is characterised as behaving with integrity and honesty. Thus it relates to clients, fellow professionals, colleagues

and society in general. The competencies that a professional irrigation extensionist should possess include both generic to professionals and more specific to the irrigation industry:

a) *Generic competencies*

- Well developed interpersonal and communication skills which form the venue for the professional encounter to be optimized. These skills range from group facilitation, conflict resolution, writing and public presentation skills, networking and monitoring.
- Business skills-operation of own business and understanding of client business needs.
- Attitude forms part of the character of an extensionists and according to Burger (1971), the credibility of an extensionist will suffer if his/her attitude and therefore character is unacceptable. One of the hallmark features of success in extension is to have “a success oriented attitude.” The general attitude of many extensionists needs to change to be able to respond to the needs of the farmers and the community.
- Trust between farmers and extensionists are imperative for successful extension intervention. Trust grows out of trustworthiness, out of the character to make and keep commitments, to be responsible and accountable for your actions.
- It is important for the development of professionalism to develop the habit of critically personal reflection on knowledge and action. It is essential within a milieu where irrigation farmers have to deal on a daily basis with complex natural ecosystems, which are difficult to predict, even if based on long-term observations. The quality of this personal reflection by professionals requires the necessary support and resources to develop those skills and to build on the confidence to profess the theories that inform their practices in public.
- Professional ethics: - Professionals are accountable for themselves, as well as for their colleagues through adherence to a code of ethics. Klutgen (1988) states that “ every genuine profession has an ethic “.

- Implementation of a well-planned continuous personal development program must be perceived as an investment with potential pay offs in terms of:
  - Increased capability to meet the needs of the industry
  - Increased rewards to the extension practitioner through the recognition of accreditation
  - Increased incentives for the extension practitioner to enhance their knowledge and skills base and to maintain their currency of technical knowledge
  - Greater accountability of quality and environmental assurance

b) *Specific competencies for irrigation industry*

- A defined body of technical knowledge and skills: essentially that the professional possesses adequate, appropriate and up-to-date applied knowledge and use it for both specific and common good.
- Natural resource management knowledge and skills: an understanding and insight of surface and groundwater management, off-site impacts, etc.
- An understanding of market mechanisms, strategies, profit drivers and industry positioning.
- Knowledge and an understanding of industry regulations, policy and registration requirements.

Given the collaborative and inter-professional working environment of the irrigation extensionists, what is the potential for sharing the experiences and therefore becoming more public? A Society like SASAE provides the necessary scope for interaction and mutual professional learning through the SASAE Newsletter and SASAE Journal, where meaningful lessons, experiences from own professional development can be shared. Or is the development of professionalism among extensionists bounded and a private affair? Does the client-extensionist relationship mitigate against the exchange of reflective insights?

Extension strives to render a professional service useable for decision making by the irrigation farmer. This however requires of us an obligation-not merely to acquire a competence, but to develop a variety of competences and to strive for excellence in each of these so that we may enjoy the satisfying, inborn human need to be useful and productive.

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### **REFERENCES**

BACKEBERG, G.R., BEMBRIDGE, T.J., BENNIE, A.T.P., GROENEWALD, J.A., HAMMES, P.S., PULLEN, R.A. & THOMSON, H., 1996. Policy proposal for irrigated agriculture in South Africa. Water Research Commission Report KV 96/96.

BEMBRIDGE, T.J., 2000. Guidelines for rehabilitation of small-scale farmer irrigation schemes in South Africa. WRC Report 891/1/00.

BAYLES, M.D., 1988. The professions. In: J. C. Callahan (Ed.) (1988) *Ethical issues in professional life*. Oxford University Press.

BURGER, P.J., 1971. Qualities of an effective extension agent. Paper presented at AGM of Natal Branch of SASAE.

CALLAHAN, J.C. (Ed.), 1988. *Ethical issues in professional life*. Oxford University Press.

CARR, D., 2000. *Professionalism and ethics in teaching*. London, Routledge..

DIOUF, J, 2007. FAO Newsroom: Coping with water scarcity. <http://www.fao.org/newsroom>

DÜVEL, G.H., 1990. Projected demands on extension- a professional extension approach. *Proc. of 24<sup>th</sup> SASAE Conference, 24-26 April 1990, Port Elizabeth.*

DWAF, (1994). *Water supply and sanitation policy - White Paper. Water-an indivisible national asset*. Cape Town.

DWAF, (2002). *National water resource strategy-summary*. First Edition.

FELLOWS, R., 2003. *Professionalism in construction: Culture and ethics*. CIB TG23 International Conference, October 2003, Hong Kong.

FREIDSON, E., 1994. *Professionalism reborn: Theory, prophecy and policy*. Cambridge, Polity Press.

GRANT, M., 1999. *Planning as a learned profession*. Royal Town Planning Institute, London.

KILPATRICK, S., 2000. Education and Training: Impacts on farm management practice. *The Journal of Education and Extension* 7(2):105-116.

KOLB, D., 1984. *Experiential learning: experience as the source of learning and development*. Upper Saddle River, NJ, Prentice Hall.

KULTGEN, J., 1988. *Ethics and professionalism*. Philadelphia: University of Pennsylvania Press.

LAFFIN, M., 1998. The professions in the contemporary public sector. In: M. Laffin (Ed.) (1998) *Beyond bureaucracy? The professions in the contemporary public sector*. Aldershot, Ashgate.

MACADAM, R., DRINAN, J., INALL, N. & MCKENZIE, J., 2004. *Growing the capital of Rural Australia, Canberra; Rural Industries Research and Development Corporation*. Report No RUE-2A.

MEYER, M. & MOKOELE, M., 2001. ETD Occupational development. In: M. Meyer, J. Mabaso & K. Lancaster (Eds.), *ETD Practices in South Africa*, Durban, Butterworths.

MORRIS, J.R. & THOM, D.J., 1990. *Irrigation development in Africa*. Studies in Water Policy and Management, No 14. West view Press. Boulder. Colorado. United States of America.

POJMAN, L.P., 1995. *Ethics*. Belmont, CA: Wadsworth.

STEYN, G.J. & STEVENS, J.B., 2002. Attributes like attitude and commitment for effective extension. *S Afr. J. Agric. Ext.*, 31:50-62.

STEVENS, J.B., DÜVEL, G.H., STEYN, G.J. & MAROBANE, W., 2005. *The range, distribution and implementation of irrigation scheduling models and methods in South Africa*. WRC Report No. 1137/1/05.

STEVENS, J.B. & VAN HEERDEN, P.S., 2005. *A conceptualised framework of a possible curriculum for training of extensionists and advisors in irrigation management*. WRC Interim Report No 2, November 2005.

STEWART, S., 1995. The ethics of values and the value of ethics: should we be studying business values in Hong Kong? In: Stewart, S., Donleavy, G., (Eds.). *Whose Business values?* Hong Kong University Press. p1-18.

VAN DER HORST, H. & McDONALD, R., 1997. *OBE Outcomes Based Education: A teacher's manual*. Pretoria, Kagiso.