Extension agents can perform more effectively through an appreciation of individual learning styles

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ABSTRACT

A universal goal of extension agents is the attainment of voluntary behavioural changes in clients. Behaviour change occurs through the process of learning new skills. There are two distinct components to learning: grasping information through conceptualisation or experience, and: transformation of information into knowledge, through reflection or experimentation. Individual clients can be grouped into one of four distinct learning styles depending on the way they grasp information and transform it into knowledge. This paper draws upon findings from a pilot study to estimate cognitive changes occuring in a group farm monitoring programme. The results identified learning preference and belief differences between expert and farmer roles within the group. It is suggested extension agents can target specific behaviour changes in client's by implementing strategies that use learning preference and belief data. Furthermore, it is proposed researchers can enhance levels of technology adoption by presenting research outputs using communication methods compatible with target clients' prefered learning styles.

Keywords: monitoring, behaviour, individual, learning, beliefs

INTRODUCTION

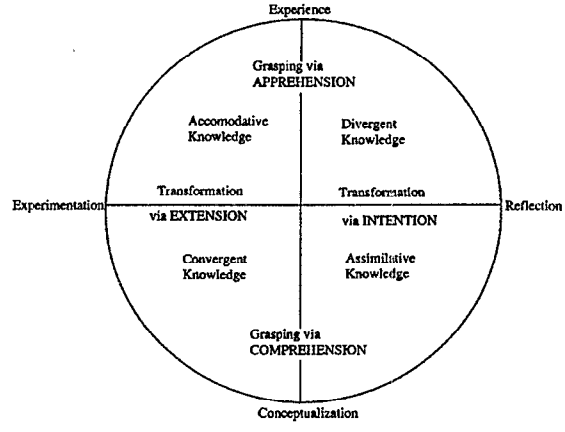
This paper draws attention to learning styles and beliefs as factors influencing the use of technology in farm practice. It contends that goal directed extension programmes can benefit from communication strategies using learning styles information.

Individual farmers are motivated by diverse goals and values (Gasson, 1973). Farm systems research has usually concentrated on farm performance problems as a prerequisite to farmers achieving their goals (Roling, 1988). In developed industries, technology and knowledge is believed to be one of the most important constraints to farm performance (Jiggins, cited in Roling, 1990). However researchers and extension workers are often required to interpret a farmer's decision-making behaviour with a scarcity of quality information (Deane, 1992; Johnson, 1993). Subsequent discussion centres on beliefs and learning preferences in relation to behaviour change. Beliefs have been described as the mental links people make between any 2 aspects of their perceived world (Paine, 1991).

The process of adopting new farming practises depends on learning experiences. Experiential learning theory has much to offer workers dealing with the behaviour of farmers. The theory holds that an individual's ability to learn will be enhanced by strategies that conform with an individual's preferred learning style (Kolb, 1984).

Kolb considers learning involves 4 adaptive modes in 2 dimensions (see Figure 1). Information is grasped through apprehending an experience or comprehending an abstract idea. Humans manipulate or reflect on the grasped information to complete the learning process. Tension exists in the learning process and is expressed through opposing modes of grasping or transforming information. A person's preferred modes of grasping and transforming information can be measured, and categorised into one of 4 learning styles (see Figure 2). In practice, learning styles are shaped by past and present experiences. An individual's knowledge of their particular farming system is a result of learning experiences (Roling, 1988).

FIGURE 1: Theory of Experiential Learning.

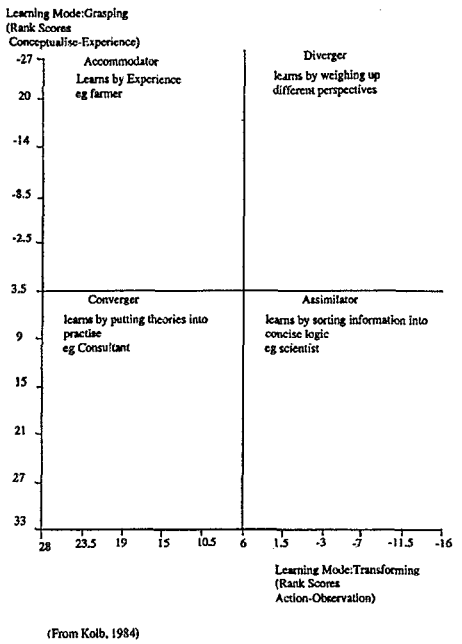


(From Kolb, 1984)

Results used in this paper are taken from a pilot study of a sheep and beef farm monitoring scheme. The pilot study was part of a more comprehensive research project analysing antecedents to human behaviour changes within farm monitoring groups.

Farm monitoring involves intensive technical and economic monitoring of selected farms to assist group decision-making processes (Webby and Sheath, 1991). A Northland group, which for the past 20 years operated as a discussion

FIGURE 2: The Learning Styles Grid.



(From Kolb, 1984)

group, established a farm monitoring programme involving scientists and consultants in 1988. Group objectives included the measurement of animal and pasture performance and the development of options for improving sheep and beef profitability (Thomson,1988). Individuals' expectations included learning, social and motivational dimensions.

To achieve the programme's objectives two farms were selected. One farm (A) had an opportunity to significantly improve farm performance (measured as economic farm surplus), whereas farmers in the district believed farm B to be an economically high performing farm - the question was, could it improve further under a monitoring programme?

Decision-making on Farm A was performed as a group process, while regular consultant workshops were centred on Farm B. Annual field days were held at both farms. A group of 15 farmers, 2 consultants and 2 scientists constituted a central core. A peripheral group of visiting consultants and scientists were periodically involved in the programme. Consultants and Scientists adopted either facilitating or monitoring roles. Facilitators managed group processes while summarising diverse concepts of farm systems, generated during group discussions, into a coherent whole. The monitoring scientist and consultant concentrated on data collection and the provision of information for group problem-solving.

The technical and economic consequences of farm management changes due to farm monitoring have been documented elsewhere (Webby and Sheath, 1991; Webby *et al.*., 1992; Webby, 1993). Both farmers fine tuned their pasture utilisation decisions (McCall and Sheath, 1993). Farmer A also made several capital developments to his farm (subdivision, water supply, fertiliser and agro-forestry).

Farm monitoring provided an environment that was strong on measurement with established personal relationships between researchers and farmers (Webby and Sheath, 1991).

STUDY METHOD

An *ex-post* study of farm monitoring participants' learning preferences was conducted. Data were gathered from participants using an interview and 2 questionnaires. Participants were divided into four roles within the group: monitor farmers - owners of the monitored farms (2); farmers (15); scientists (2); and consultants (2).

Interviews were conducted at the participant's farm or place of work. Ten open questions were used to allow the person interviewed to express their thoughts about farm monitoring. Participants required approximately 30 minutes to complete the interview.

The first questionnaire used a Learning Styles Inventory (LSI) to determine each participant's learning preferences (Kolb, 1984). The final form of the LSI is a 12 item self-description questionnaire. Each item asks the participant to rank order four words in a way that best describes his or her learning style. Each of the ranked words corresponds to one of the four learning modes (Experiencing or conceptualising, acting or observing). Participants were asked to briefly consider each item before responding. If individuals pondered a particular item for too long they tended to express doubts about their ranking orders. LSI's were usually completed within 10 minutes.

Learning style rankings make no assessment of learning levels, which are typically determined through examinations.

Each participant's learning style scores were plotted on a grid to determine common learning preferences within the group. The grid's boundaries were calculated using learning style scores from a normative group of 1,446 adults with diverse occupations and ranging from 18 to 60 years of age (McBer, 1985).

A second questionnaire was used to determine participants' beliefs about factors responsible for the change in Farm A's profit performance during the programme (Saunders and Townsley, 1991). Profit was defined as the economic cash surplus, using the same procedure as the MAF Financial Monitoring programme (Morriss, 1990; MAF, 1992). It has been claimed that Farm A's Profit increased by 18% and Farm B's by 16% over the life of the programme (Webby et al, 1992). To measure the similarity between objects participants were asked to visualise a "ruler" in their minds, providing a tool to measure distances. The "ruler's" scale was based on identical items being 0 distance apart, and dissimilar objects (eg the pair "good" and "bad") were said to be 100 units apart. Participants were free to use values larger than 100. Distance comparisons were made between group roles, the monitoring task and Farm A's profit performance. A distance matrix was constructed for each participant, using the scale distances between objects. Belief changes over the duration of the project were estimated by participants using their current beliefs and reflecting on the beliefs held at the start of the programme. Perceived changes in beliefs were plotted with respect to Farm A's profit performance and the task of monitoring. Participants required approximately 20 minutes to complete the pair comparison questionnaire.

RESULTS AND DISCUSSION

Interviews revealed a diversity of valued learning experiences.

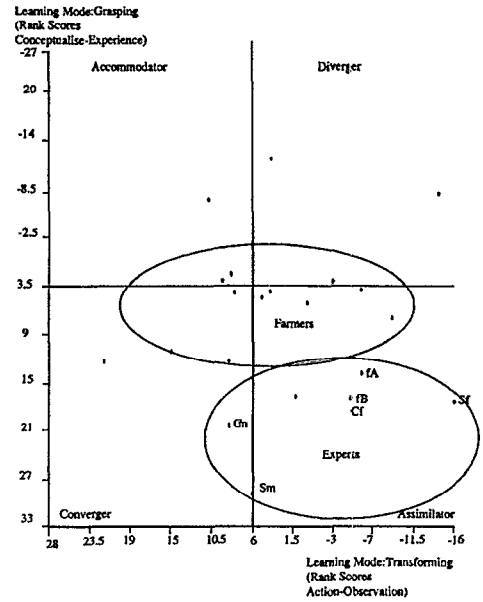
- Farmer A valued a reflective time, following monitoring meetings, where he would question himself as to his actions.
- Farmer B valued experiences involving field day preparations - requiring diverse information to be organised into a coherent message for farmers.
- The facilitating scientist valued the programme's demand on science to front up to its successes and failures. As a result he was forced to think further on issues of presentation and the testing of science outputs.
- The monitoring scientist valued those challenges which forced him to make scientific information practical and relevant to the circumstances confronting farmers.
- The facilitating consultant valued group learning processes requiring all participants to own the recommendations made to the monitor farmer.
- The monitoring consultant valued the group's scrutiny of his work. In particular, the task of constructing and seeing through management plans that drew his understanding of components of sheep and beef farming together into a comprehensive framework.

ExPost analyses of learning styles provided static images of a dynamic process. More powerful pictures of participants' learning styles could be achieved by regularly monitoring, similar to the repetitive monitoring of technical and economic parameters. However, this initial information from participants yields several insights for extension programmes.

Figure 3 locates all participants on the Learning Styles Grid. Analyses of the group's learning styles found the assimilator style (n=9) to be dominant, followed by the converger style (n=6). Several individuals playing important group roles are identified on the grid. Farmer B and the facilitating consultant had identical learning styles. Scientists, consultants and monitor farmers comprised an expert group possessing a strong preference for grasping information via comprehension.

Experts within the programme expressed assimilator learning styles consistent with experiential learning theory (Kolb, 1984). However, at the conclusion of the programme farmers were closer to experts than would be expected of individuals employed in a predominantly task orientated occupation (accommodator). Furthermore, monitor farmers were exceptionally close to experts - their learning styles were indistinguishable from scientists and consultants. These findings suggest farm monitoring has influenced farmers' learning styles, shifting individuals towards an assimilator learning mode. However, regular monitoring of learning styles by farm monitoring groups is required to determine the rate and magnitude of learning style change. A knowledge of changes in learning styles within the group enables extension agents to implement and evaluate advisory, exposure, confrontation or model building learning strategies (Stuart, 1990). To have an entire group perfectly aligned does not imply a loss of innovation and diversity of thought within the group.

FIGURE 3: Learning Styles Grid, Farmers, Consultants and Scientists.

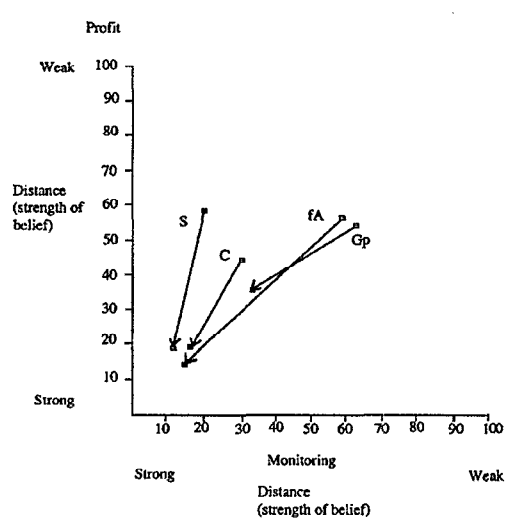


The grid discriminates between facilitating and monitoring experts. The monitoring scientist has a strong orientation towards analysis (information grasping component of assimilator/converger styles) compared to the facilitating scientist's emphasis on reflective transformation (organising information into logical arguments). Several farmers described the monitoring scientist as, "a ready reference" and the facilitating scientist as, "having a logical way of thinking during discussions".

Beliefs

Dynamic pictures (based on participant recall) have been used to portray changes in participants' beliefs over the life of the programme (see Figure 4).

FIGURE 4: Change in Core Farmer Grop Beliefs.



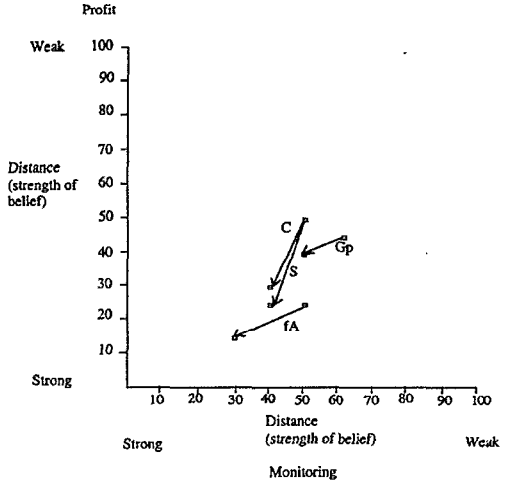
The group believed Farm A's Profit was primarily related to consultancy input at the start of the programme. The group perceived Farmer A, consultants and scientists to

be more closely related to the profitability of Farm A over the course of the programme. This small team appears as an inner group in the minds of the core farming group. Furthermore, the group developed stronger beliefs about the importance of monitoring over time. The trend for most farmers in the core group to purchase stock scales during the farm monitoring programme was probably one outcome of this change in belief.

By the conclusion of the programme the group believed Farmer A was more like the expert group, in terms of beliefs about monitoring and profit, than the farmer group. Monitor farmers can play an important role in linking science with farming practise, by documenting the processes responsible for significant changes in their belief structures, thereby aligning efforts towards group goal attainment.

Comparisons between individuals indicates a similar pattern of changes in beliefs. Farmer A and the facilitating experts believed all participants within the group had more influence on Farm A's profit and were more inclined to monitor (see Figures 5a to 5c). Farmer A believed he was a more significant factor determining his farm's profitability than scientists and consultants. However, the facilitating scientist and consultant made little distinction between different participants' relationship to Farm A's profitability at the conclusion of the programme. Furthermore, scientists and consultants believed the practise of monitoring varied significantly between participants throughout the life of the programme.

FIGURE 5A: Change in Farmer A's Beliefs.



New communication opportunities could ensue to extension workers who analyse changes in their client's beliefs. Compare Farmer A (Figure 5a) and Consultant (Figure 5b) beliefs about participants and farm profit. At the conclusion of the programme Farmer A believed he had a stronger influence on his farm's profit performance than any other participant. However the consultant's belief, that all participants had an equal contribution to Farm A's profit performance, was more consistent with the Farm Monitoring concept of group decision-making. By exploring these differences in beliefs an enlarged understanding of each perspective ought to be achieved. Farmer A may believe he is committed and

FIGURE 5B: Change in Facilitating consultant's Beliefs.

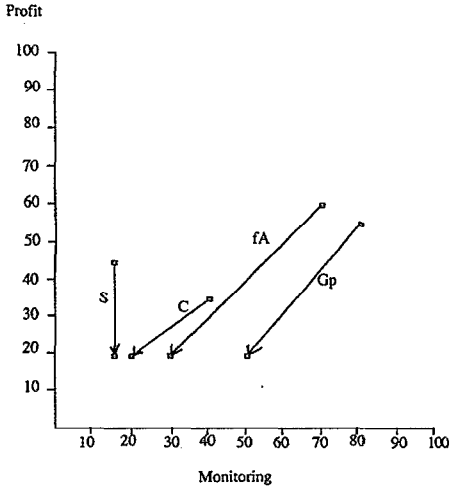
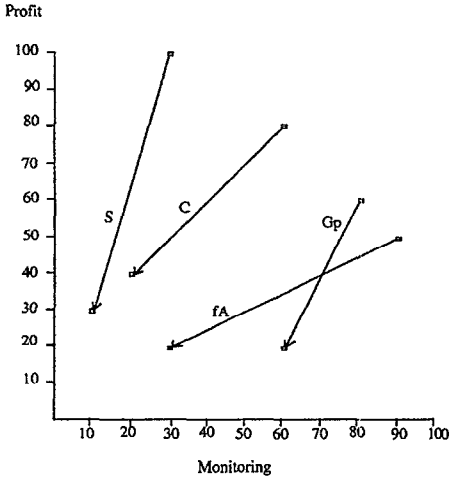


FIGURE 5C: Change in Facilitating Scientist's Beliefs.



accountable for his farm profitability, whereas other participants' are merely involved in his farm's profit performance. The consultant may have been the primary source of innovations and new ideas, believing these to be central to the farm's profitability, while the farmer placed higher priorities on fine tuning existing systems. In contrast to the consultant's view of a farm group decision-making process, Farmer A sees himself as the principal decision-maker receiving assistance in his task from others participants. A group ought to evolve towards more effective goal attainment as its belief differences are identified and negotiated to a point of agreement.

CONCLUSIONS

The study identified individual differences in learning styles. These differences can be used to design and evaluate intervention programmes. For example interventionists can develop support relationships between individuals with opposite learning styles. Such learning relationships would emphasis the strengths of each style by allocating learning activities in different situations to the participant possessing the more effective learning style. Accommodators would

therefore assist assimilators to learn in task orientated environments.

A second strategy could apply the strengths of each learning style to problem-solving challenges. A farm monitoring programme confronted with a need to identify the cause of poor performance from a farming system may benefit from analysing the way divergent learners diagnose the situation. How do assimilators evaluate alternative courses of action? What procedures do convergers use to select solutions to problems? Are accommodators recommendations for implementing a solution similar to recommendations from others learning styles in the group? A group's problem-solving skills ought to advance as it analyses the learning processes it adopts when solving problems.

A final strategy available to groups using learning styles information focuses on improving adaptive learning skills. A scientist, with an assimilator style, choosing to learn in a farmer's learning environment will need skills to deal with people, be goal orientated, actively seek opportunities and possess leadership abilities. A farmer, with an accommodative style, may need to acquire information from a science environment and will therefore need to develop data analysis skills and have an ability to organise and interpret information - possibly involving the building of models, testing of theories and design of experiments.

The foundations of behaviour change involve dynamic processes requiring regular monitoring of learning and belief systems, allowing extension workers to appropriately adapt learning strategies. Monitoring and discussion of individual differences, using learning styles and belief information, can improve communications and focus group participant roles onto complementary tasks for goal attainment.

Extension programmes using learning research techniques ought to be more effective at managing change processes occurring in groups. Behavioural monitoring can complement technical and economic monitoring to provide a comprehensive picture of changes in farming systems that result from intervention programmes.

FURTHER RESEARCH

Following this exploratory study, it is suggested 3 areas of extension research are worthy of further enquiry.

- **Development of Appropriate Monitoring Methods**

  Dynamic processes require the development of measurement techniques that cost effectively capture the magnitude and rates of change occurring in behavioural components of farming systems. Developments in behavioural monitoring methods could centre on tasks involving programme evaluations and group facilitation processes (particularly information utilisation techniques). Methods need to be designed that will integrate behavioural with technical and economic monitoring, creating a multi-facet perspective of farm systems for managerial control.

- **Design and Evaluation of intervention strategies**

  Behavioural research into farming systems needs to move from exploration to intervention. Procedures need to be established for the design of intervention strategies that will have a high chance of success. The merits of existing intervention strategies need to be assessed in terms of their behavioural impact. These assessments will often require the use of more refined goals for programmes than the achievement of certain technical or economic targets.

- **Predictive Models**

  Predictive models of human behaviour would assist extension workers target clients for existing programmes and modify programmes for new classes of client groups. Human behaviour model developments could focus on servicing science managers required to set research priorities. Managers formulating agricultural policy may provide a second suitable context for model development.

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