

An investigation of the thinking styles of agriculturalists and their use of information technology

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Abstract

Taking as point of departure research on different preferential thinking styles that humans employ, the authors argue that there is no assurance that a particular decision arrived at by a person employing a particular thinking style (e.g. the synthesizer style) will be accepted by a person employing another thinking style (e.g. an idealist style). We further argue that by combining a range of critical thinking skills when drafting reports, for instance an Information Technology (IT) Strategic Plan presented to a group of strategic decision-makers that would most likely comprise of individuals employing different thinking styles, the chances are increased that such a plan would be acceptable to most of them. The authors also point out that, similar to the problem solving approach employed in scientific reasoning, the thinking style known as the critical thinking style should be used by IT managers, which entails first identifying an actual problem and thereafter employing modes of evidence gathering that aim to generate a solution to the problem. The paper points out that by consecutively wearing Edward De Bono's metaphoric six differently coloured thinking hats, managers can obtain different perspectives on a particular problem. The paper finally recommends particular strategies that managers could employ to get IT recommendations accepted.

Keywords: information technology, agriculturalists, thinking styles, communication

Introduction

The paper addresses the need to apply research about preferential thinking styles to solve IT related problems in a specific sector of the South African economy, namely the agricultural sector. An electronic search, using the terms 'thinking styles' and 'agriculture' revealed that these subjects have sparsely been investigated in the South African context. Therefore, to gain a competitive edge, or to improve the supply chain management of organic products, agriculturalists should be harnessing the power of IT while at the same time applying thinking styles such as Idealist, pragmatist, etc. For the purpose of this paper the definition of an agriculturalist will be 'a farmer and or a senior farm manager with decision making responsibilities.' In Section 2 the paper addresses thinking styles. In Section 3 it discusses the research methodology. Section 4 looks at the results and discussion of results and finally there will be recommendations and a conclusion.

Characteristics of thinking styles

Thinking styles are basic sets of purposive methods for making sense of the world. Thinking styles are built on early-acquired preferences, on learned values and on concepts about the world and the nature of reality. Harrison and Bramson (1984) conclude that in Western Society there are five distinct styles of thinking.

- synthesist;
- idealist;

- pragmatist;
- analyst; or a
- realist.

There are different schools for thinking styles but for this article the Harrison and Bramson School was selected because it was deemed to be taking the idea of information handling into consideration. Kienholz (1999) argues that one effective means to leverage knowledge is for those involved to be mindful of the various ways people actually go about gathering data, asking questions, solving problems and making decisions. Harrison and Bramson's Inquiring Mode Questionnaire (InQ) and their related education materials help through their application in developing the ability to use each of these inquiring modes and in working more effectively with each other in terms of IT.

Categorising thinking styles

Harrison and Bramson (1984) categorise thinking styles as follows:

- *Synthesist*. Are integrators; they like to discover two or more things that no other people may appear to have little of or no relationship at all and find ways to fit them into a new, creative combination. Synthesists tend to be interested in conflict and also like change – often for their own sake and might accept technology upgrades easily. Synthesists tend to pride themselves on their 'creativity'.
- *Idealist*. The idealist mode of thinking is used by people who like to take a broad view of things and tend to be future-oriented. They also think about goals and are interested in social values. Idealists are like Synthesists in their focus on values rather than facts. Idealists like to be seen by other people as useful, supportive, open and trustworthy. When it comes to solving problems, Idealists are at their best in situations where the important things are values, judgment, feeling and emotions.
- *Pragmatist*. The motto of the Pragmatist is 'Whatever works.' They excel at finding new ways of doing things with the materials that lie at hand. They are apt to be interested in formulating strategies and tactics for getting things done and they often like to be liked, approved of, or at least accepted. The pragmatist approach is flexible and adaptive.
- *Analyst*. The Analyst approaches problems in a careful, logical, methodical way, paying great attention to details. Analysts analyse and judge things within a broad framework that helps to explain and arrive at conclusions. Analysts want to be sure of things, to know what's going to happen next. They take pride in their competence, in the sense of understanding all the facets of whatever the situation in which they happen to be.
- *Realist*. The Realists motto is, 'facts are facts.' Realists firmly believe that any two intelligent people, properly equipped with eyes and other sense organs, will at once agree on the facts. Without agreement on the fact, Realist believes, things don't get done. The Realist always wants to get things done by proceeding on the facts that are at hand, rather than by gathering ever more data as Analysts do.

Multiple styles of thinking

It is, however, naïve to assume that all individuals neatly fit into one or the other thinking style category (Harrison & Bramson, 1984). This section discusses multiple styles of thinking. Harrison and Bramson (1984) categorise multiple thinking styles as follows:

- *Idealist-Analyst (I-A)*. The I-A is characterized by a broad, comprehensive view. They are careful, thoughtful people who want to achieve the ideal goal using the best method possible. They are unlikely to make quick decisions and possess a future-oriented, planned view of things.

- *Analyst-Realist (A-R)*. The A-R person is highly task-oriented and objective. They like facts and structured approaches to problems. The A-R does not like situations that defy analysis and when confronted with such a situation they tend to be unable to cope.
- *Synthesist-Idealist (S-I)*. The S-I thinking style is in many ways the exact opposite of the A-R. The S-I will tend to focus on ideas and inferences rather than structure and facts. They are perceived as being conceptualised and theorists by other individuals and therefore not very practical.
- *Idealist-Realist (I-R)*. The I-R is characterised by the twin thrust of high standards and concreteness. They know how things should be done and also have the skill set to carry them out. They don't seek a lot of recognition for their efforts.
- *Pragmatist-Realist (P-R)*. The P-R is highly task oriented but approaches things in a less structured manner than the A-R. They tend to have considerable energy and drive and achieve things solely for the sake of achievement. They tend to make quick decisions with a minimal amount of data and as a result can quickly become overextended.
- *Idealist-Pragmatist (I-P)*. The I-P combination is typical of someone who gains agreement on goals and then tolerates a great deal of latitude in method. They have a great concern for 'people' issues and more in tune with a person's needs. As a leader, the I-P will appear to be over permissive and be allowing of too much latitude.
- *Analyst-Pragmatist (A-P)*. The A-P likes facts and structure but also is willing to experiment. They know what they want and how to get there but want to have fun along the way. This can be quite damaging in relationships due to the fact that serious goals and directions will appear to be not taken seriously by the A-P.
- *Analyst-Synthesist (A-S)*. The A-S respects structure and logic. The Analyst style seems to be more dominant in this combination most of the time. Whereas the Analyst respects structure and logic, the Synthesist understands and values the opposite. This can be the source of great internal conflict and a profound lack of understanding by people around them. They can, sometimes be very difficult to listen to but have a lot to contribute.
- *Synthesist-Pragmatist (S-P)*. S-P's show the greatest tolerance for change. They strive on ambiguity and uncertainty and have developed the coping mechanisms to deal with both. Their thinking style generates tremendous amount of creativity.
- *Synthesist-Realist (S-R)*. The S-R is extremely rare due to the fact that the synthesist and realist are at the opposite ends of the thinking spectrum. The S-R is a person with great energy for unorthodox but firm achievement. They can see clearly what the proper course is and also see that the opposite way is just as acceptable.
- *Three Way Thinkers*. People that possess a strong preference for three of the five styles tend to be creative. This flows from the idea that they have more thinking styles available to them. They are versatile and can rely on the style that suits an individual situation.
- *Flat Profile*. The rarest of thinking style preferences is a person who shows no preference for any specific style. This is where the InQ test shows a relatively equal score for all five thinking styles. These people tend to be unpredictable, less intense and less recognisable than people with strong preference for other styles.

Related research into thinking styles

According to Harrison and Bramson (1984), the most productive thinkers may simply be those who are capable of thinking well in all five dimensions. They further state that the Synthesist and Idealist styles are strongly oriented toward the 'value' side of the dichotomy or substantive rationality while the Analyst and Realist approaches are clearly more oriented toward 'facts' or formal, functional

rationality. The Pragmatist, contingent approach either bridges the gap between the two or perhaps ignores the question altogether.

Kienholz (1999) states that the Synthesist and Idealist inquiring modes are substantive, value-oriented ways of thinking and knowing, while the Analyst and Realist are functional and fact oriented and should accept technology easier. Kienholz (2000) finds that a solid understanding and appreciation of the different preferences that people hold for each of the thinking styles can lead to an improvement in the design of information and knowledge management systems and should be kept in mind by farmers and farming leadership.

DeLisi *et al.* (1998) note that the results of the research indicated that professionals are less likely to employ an analytic thinking style and more likely to employ an idealist or pragmatist style. Perpetuation of the stereotype, as stated by DeLisi *et al.* (1998), impacts on the role of professionals in the organisation in three ways:

- It limits their opportunities for job assignments that have strategic impact on the organisation like the use of IT.
- It limits their opportunities for promotion to the highest levels of the organisation.
- It affects their relationships with clients and senior executives.
- These limits in turn affect the successful use of IT by agriculturists.

Before DeLisi *et al.* (1998) administered the InQ questionnaire, the participants were asked which thinking style they believe will be most common among the sample group. Almost universally, they stated that the analyst style will be most prevalent. This will tend to have a self-fulfilling effect; with professionals more likely to volunteer for activities that are detailed and analytical in nature rather than volunteer for leadership positions that require a skill they do not perceive that they have. Hence this study by DeLisi *et al.* (1998), deduces that a large percentage of professionals tend to have idealist characteristics.

Zhang (2002) states that the styles of thinking contribute to academic achievement beyond what can be explained by abilities. He also finds that good agriculturists could foster creativity by using the thinking styles. The understanding of how staff thinks can help farmers and farm managers in using different managerial styles and different schemas to foster creativity by accommodating to and challenging the development of multiple thinking styles.

The impact of thinking styles on IT

According to Zhang (2001), there are many reasons why some students get distinctions in their courses because there are ways of explaining individual differences in academic achievement. He states that traditionally, many psychologists and agricultural educators have attributed agricultural students' successes and failures in academic achievement mainly to individual differences in abilities (maybe to use IT), but in recent times, scholars have been examining other factors that affect students' learning outcomes and the eventually application of IT in organisations such as farms. Sternberg and Grigenko (1997) note in their paper that there are profitable directions (such as proper training using a thinking style approach) when one conduct research in thinking styles. Zhang (2001) believes that the different thinking styles do more than just facilitate students' intellectual development. Thinking Style also helps enhance student development in how to work and deal with their peers and eventually accept changes in IT strategic planning. He also finds that the thinking styles were related to agricultural academic achievement and had implications for teacher training – this could be applied especially in terms of IT and agriculture. Hence, it can be deduced that an understanding of thinking styles could improve agricultural educators' teaching and thus, the acceptance of technology (IT) in agricultural environment. Lin and Liu (2003)

further state that the thinking styles could assist agricultural educators in identifying individual differences in thinking and acceptance of items such as technology among students and help them to consider students' needs in a more individual base. Zhang (2002) identifies a variety of methods for inducing the use of the thinking styles. One of his methods was that educators should start giving consideration to the fact that repeated studies have found that both school and university curricula around the world tend to penalize creative thinking and thus the use of IT. He further stated that in order to produce students who are going to be capable of adapting themselves to the ever-changing world (especially in terms of IT use), educators must start cultivating students' creative thinking during their educational career. Husband (2006) argue that educators should produce students that can critically think by taking their thinking style into consideration to enhance the effectiveness of thinking during the teaching of technology and the use thereof in the industry you work in (in this instance agriculture).

According to Stuhlman (2004), culture is a combination of organisational history, shared experience, group expectations, unwritten or tacit rules, ethics and social interactions that affect the behaviour of everyone in the organisation. Some of these apply during the IT strategic plan. Bernardo *et al.* (2002) further state that formal educational institutions tend to promote knowledge and skill to use IT that are valued by the larger culture or society within which they operate. Accordingly, educational systems in different cultures might also value and encourage different thinking. Fleck (1997) argues that culture and contingent knowledge plays a crucial role in technology development and innovation. This should be taken into consideration when it is being implemented in fields that use technology a lot like farmers.

Research methodology

The aim of this research was to determine the thinking styles of agricultural students in relation to the marks they obtain. The authors have decided to use a questionnaire as an elicitation instrument to obtain the data. The purpose for using a questionnaire in this research is because the authors could not determine an individual's thinking style without the use of a questionnaire as other forms of measurements may make individuals feel uncomfortable and withdrawn. The questionnaire that was selected was a trusted questionnaire that had been used by many other studies. The questionnaire was validated and reliable and could only be used in the format acquired. Nothing was changed because it can generate mixed responses and may not be a reflection of how the individual thinks. The InQ as designed by Harrison and Bramson (1984) was used for this study. According to DeLisi *et al.* (1998), the InQ instrument is one of a number of instruments that measure individual thinking styles and related variables but it differs from other instruments in that it looks at how people process information – something to which people can easily relate and it stays away from personality measurements, such as introversion or extraversion, thereby avoiding the defensiveness that might result from a discussion of one's personality. The respondents were picked from the agricultural discipline. A sample of 144 completed questionnaires from a population of 230 was returned. Since it takes a while to complete the authors decided to use the returned and correctly completed questionnaires (134). The population were students in an agricultural college that was there as full-time students or doing a refreshers' course. The data was presented in tabular format and the Spearman Correlation method was used. Not all the results could be included since the maximum length for this paper was 8 pages. Some additional results would be presented in the presentation.

Data collection method

The questionnaire was personally administered to the respondents because according to Sekaran (2002) this type of data collection method is less time consuming and less expensive. This method is most appropriate because if respondents have doubts on the questions, it can be clarified immediately. Compared to mail questionnaires, this has a higher response rate. The thinking styles of agriculturists were measured using the InQ questionnaire and these scores were used to determine their thinking style. Once their thinking styles were established, respondents with the same thinking style were grouped together and a correlation was established between their ranges of their examination marks and their style of thinking.

Results and discussion

The InQ questionnaire does not ask for demographics and since it is a lengthy questionnaire it was decided to only use the data obtained from the questionnaires. Questionnaires were given to the respondents and 134 responses were received for analysis. A follow-up study with a larger population is envisaged to ensure that one could measure the background of the respondent with the profile. According to Kienholz (2000) preference for a mode(s) is indicated by a score of 60 or more. Profiles are explained in terms of one-way thinkers, two-way thinkers, three-way thinkers and level profiles. Results for are as follows:

- One-way thinkers = 122 or 91% of the students. (Seven were Synthesists, thirty-seven were Idealists, twelve were Pragmatists, sixty-two were Analysts and four were Realists).
- Two-way thinkers = 11 or 8% of the students. (One was Idealist and Pragmatist, one was Analyst and Synthesist, two were Analyst and Realist, four were Analyst and Pragmatist and three were Idealist and Analyst).
- Three-way thinkers = 1 person had a preference for Pragmatist, Analyst and Realist styles of thinking.

There were no students who preferred level profile thinking, that is, students who preferred four or five styles of thinking. The majority of this group is Analysts which differ from the people in other countries which have shown an idealistic profile. This could thus impact on agricultural leadership in IT because they might have to follow a different style to handle SA thinkers. Respondents in the sample were aged between 19 and 28 years old and 35% of the sample was male. The following table gives an indication of the mean differences as well as the percentage of students who scored 60 or more.

There were no participants who scored 48 or less in each inquiry mode. As demonstrated in Table 1, the range differences are very close. The authors therefore concluded that the students preferred the analyst style of thinking, since 45% of the respondents had a score of 60 or above in this style of thinking. The range difference also indicates that the scores for each respondent in each style of thinking were quite close. This is important as the rest of the world was indicated by DeLisi *et al.* (1998) as idealists.

Figure 1 depicts the correlation between the respondents' examination mark and their style of thinking. Four of the styles of thinking show a positive relationship between the style of thinking and the student's examination mark. The strongest relationships exist between the Synthesist and Pragmatist styles of thinking and their relevant examination marks. The reason for the Synthesist having the strongest relationship is because they have a tendency to look at a problem from many different perspectives and can usually come up with some pretty creative solutions because they enjoy conflict or being asked to come up with solutions to the 'unsolvable problem'. The Pragmatist

Table I. Mean difference.

	Synthesist	Idealist	Pragmatist	Analyst	Realist
Range	(57-66)	(56-75)	(58-67)	(59-73)	(61-63)
Differences	9	19	9	14	2
Group means (N=134)	60.57	63.92	63.08	65.60	61.50
% of participants scoring 60 or above in each inquiry mode:	4	24	8	45	3

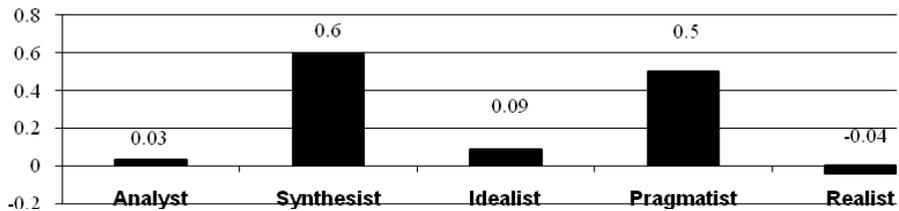


Figure 1. Correlation between responds examination marks and their style of thinking.

is like the Synthesist that is why their correlations are so close; they are resourceful and creative individuals that are problem solvers and creators of solutions. Their solutions tend to be a bit risky than those of the Synthesist but are innovative with a better payoff and therefore support the findings by Harrison and Bramson (1984).

Idealist thinkers on the other hand, have a low correlation because they delay from too many choices and try too hard for perfect solutions. They can also appear overly sentimental. The analyst also produced a low correlation as they tend to over analyze and over plan. They can also be overly cautious and try too hard for predictability. Therefore these findings support the findings by Harrison and Bramson (1984).

Realist thinkers produced a negative correlation because they rush to oversimplified solutions and try too hard for consensus (Harrison and Bramson, 1984). The correlation between the examination marks and the one-way thinker's displayed a low positive relationship of 0.18, while the two-way thinkers had no correlation between their examination marks and both their styles of thinking. The individual who had a three-way thinking style had an overall C examination score. This shows that a combination of thinkers might not be able to solve a problem cooperatively and will affect systems building.

Recommendations and conclusion

It should be noted that it is not just individual workers that take a connected approach, Google for instance uses thinking styles in a lesser approach to ensure that people pay attention to the searches Google produce, for instance. The authors propose that thinking styles should be implemented because this would improve areas where there are shortfalls in knowledge, experience and skills in terms of IT. Creating a customer-centric model necessitates organizational changes to the current way in which the thinking styles are handled and will require management support at the local

level as well as at the corporate level, for these changes to be realized and to ensure that IT and the strategic IT plan is realized.

From findings in the research done in this paper, it would be beneficial to have training sessions in IT that use examples of thinking style training initiatives and the quantified value-added savings these implemented approaches have helped the farmer to realise. The suggestion is that all the parties attend these sessions so that there is a sharing and diffusion of thinking style knowledge between the teams. Farmers need to become a knowledge creating company where the knowledge of thinking style training specialists from the IT strategic services team and the transaction team is shared within the organization.

Based on the research done there are differing levels of competency in understanding thinking styles. Farmers need to become a thinking style approach organization. The authors recommend that agriculturist should take note of Zhang's (2002) statement on the three ways in which IT managers can modify agricultural staffs' thinking styles. This can help increase the staff's achievement. They are as follows:

- Present the customer, the nature of their business, location size etc. in a digital format. This is important in generating identification amongst staff and provides a basis for global identification with thinking styles of customers and staff.
- By identifying the thinking style helps with the details of what staff needs and eventually assists to select the IT service provider.
- Alternative approaches, in terms of both techniques and alternative thinking styles, need to be considered when discussing technology adoption plans.
- Describe, ideally using the workers own words, the criteria that s/he use to select between the alternatives in applying his/her thinking style while using IT.
- Describe in detail how the farmers solve this problem and satisfied the workers IT needs, ideally with positive experiences of proper thinking style applications over a period.
- Agriculturists should re-examine and redesign their managerial IT models. The new agricultural managerial IT models should be such that they allow multiple thinking styles and that they put together the specialized functions of both the modes of thinking to ensure successful IT applications.
- Agriculturists should also encourage the use of thinking styles by providing IT staff with opportunities for participating in organisational activities. This will lead to creativity-generated thinking styles and advanced cognitive development.
- There is also an indirect way of allowing agricultural staff to use multiple thinking styles and to be engaged in both modes of thinking. Agriculturists should be allowed to use creativity-generated thinking styles in their IT application and digital interaction with staff in general.

The respondents represent the views of the present and prospective agriculturalists and the authors were able to develop a forecast of the outcome based on the quality of the InQ test and the impact of IT. The material designed for lectures in agriculture should be enhanced to develop the thinking styles of each person. It could help deliver learning material to students as action programmes aimed at achieving the proposed outcome of the system – better agricultural practitioners.

The conclusion that the authors arrived at is that thinking styles need more attention. The authors believe that by understanding the thinking styles of agriculturists, Information Technology experts can help agriculturists build custom made software for their particular environment to give them a competitive edge locally and internationally. The authors see this paper as a first step in a longitudinal study on thinking styles in the South African and global agricultural sector. The study might also be conducted in other sectors if the need arises.

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