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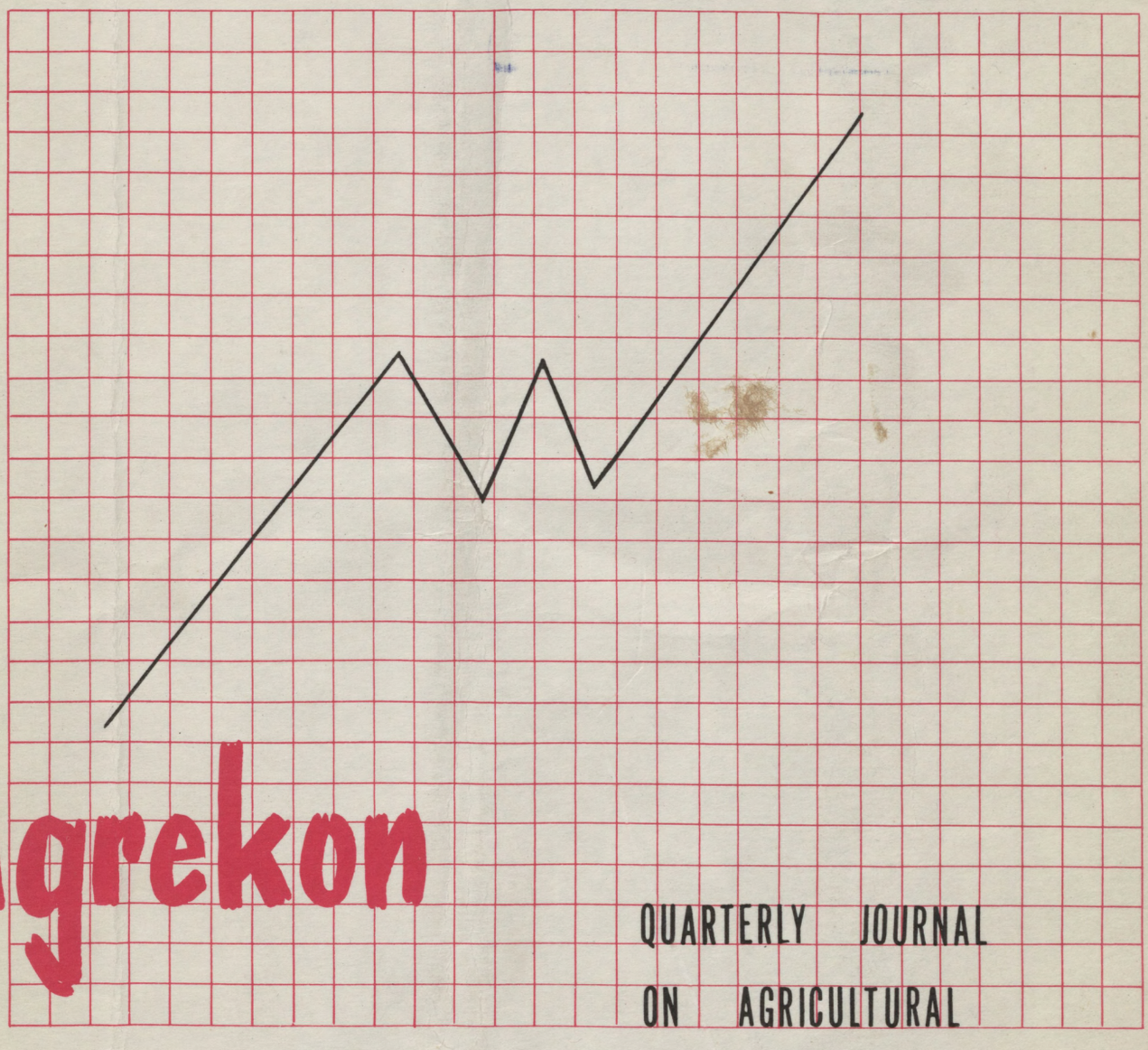

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METHODOLOGY IN AGRICULTURAL TRAINING

by

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INTRODUCTION

Reference is frequently made in education to the so-called didactic triangle (see Fig. 1 for an exposition thereof) which concerns the relationship between the subject matter of tuition, the lecturer and the student. The first-mentioned is to be discussed by Groenewald and Spies, while the other two components will not be treated directly. A few remarks with reference to the lecturer and the student will therefore be included as background material, while this paper will be devoted mainly to the methodological aspects of the carrying-over of the tuition matter by the lecturer to the student.

The title of the paper refers to training, whereas the approach at a university should probably be in terms of education. The teaching of agricultural economics is, however, to a certain degree conventionally profession-orientated and is consequently incidentally placed on a lower rung on the academic ladder[4]. This creates problems when the student registers for an advanced degree[2].

The contents of this paper, however, refer mainly to undergraduate training; for the greater majority of students this is the terminal degree. This subject is here considered from the viewpoint that every factor determining the kind of employment agricultural economics graduates will enter into, will influence the structure and character of the education they receive. We do, after all, teach our students that production should proceed according to the demand (at least, that was so before the recent butter debacle!). We also proceed from the (false) assumption (in typical economist fashion) that we have knowledge of the scope and nature of the demand for agricultural economists[31 25 56]. The personnel complement in our university department must also be kept in mind, particularly when comparisons are drawn with similar departments at certain foreign universities. This is that much more important when we realize that some of these departments are concerned about their "limited" number of lecturers[4].

THE LECTURER

The lecturer has the responsibility, firstly, to strive after the objectives of higher education[65]. These objectives (Slabbert[61] refers to the aimlessness existing at universities as the result of resistance to change) may be expressed as follows: to help young people gain a basis for the development and reconstruction of capabilities over a period of 50 years, in order that they may meet the demands set by a rapidly-changing society[57]. James[32] puts it more simply, namely that the student must be taught how to live and how to make a living.

Objectives should be consistently formulated, beginning with those of the university and progressing to those of the individual lecture, as set out in Figure 2[61]. "There is not much sense in formulating objectives if they are not brought into relation with the methods which will be used in an attempt to realize or to evaluate them; at the same time it must in the formulation of objectives be borne in mind that the subject matter is continuously changing and has to be adapted, not only as regards the contextual but also as regards the method of education" (61, p. 206).

Simultaneously with the setting-up of objectives the lecturer must thoroughly plan his presentation of the tuition material. The utilisation of applicable teaching aids is important in this regard.

In addition, the lecturer will have to define the place and position of the tuition material in the total structure of the subject[61] as well as indicate to the student how the subject relates to the rest of his course. The general tendency is to give the student a series of "pillars" (portions of subjects or complete subjects) and then to have him place not only the "bricks" between the pillars, but also to construct the "roof".

Wertz[6] maintains that few lecturers are dedicated educationists, mainly because recognition is given via the research activities, and Hess[29] warns us not to inspan the research cart before the horse. In the Van Wyk de Vries[67] and Robbins Reports[55] mention is also made of this problem, as well as that research should form an integral part of the lecturer's activities.

Beyond that, few lecturers received training in the art of teaching[22]. According to Harin[27] it is difficult to comprehend why the supposition exists that the ability to teach is wide-spread while the ability to discover new knowledge is extremely rare. Universities also devote more attention to matters pertaining to lecturing than to the learning process, since nowhere is the quality of the product measured while on the other hand the lecturer is rewarded for teaching well (especially in the USA)

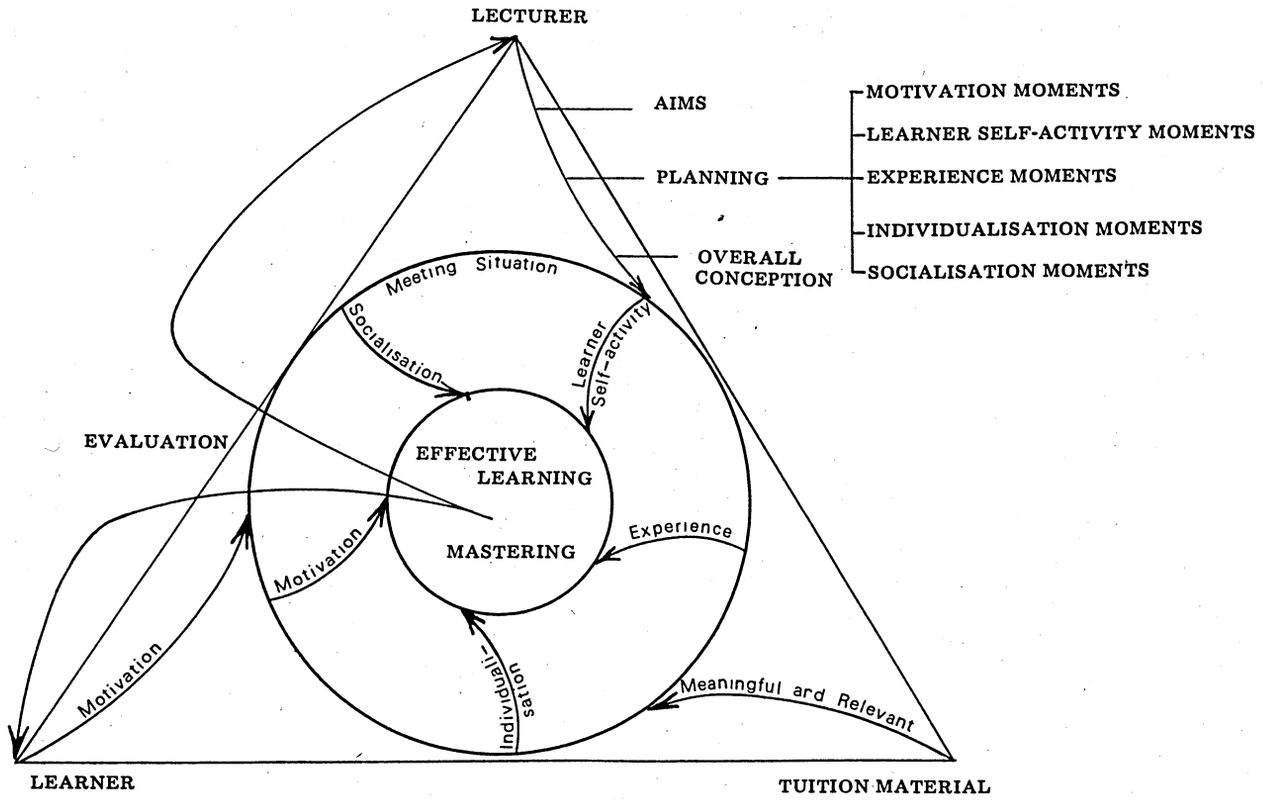

FIG. 1 — The didactic triangle (61, p. 205)

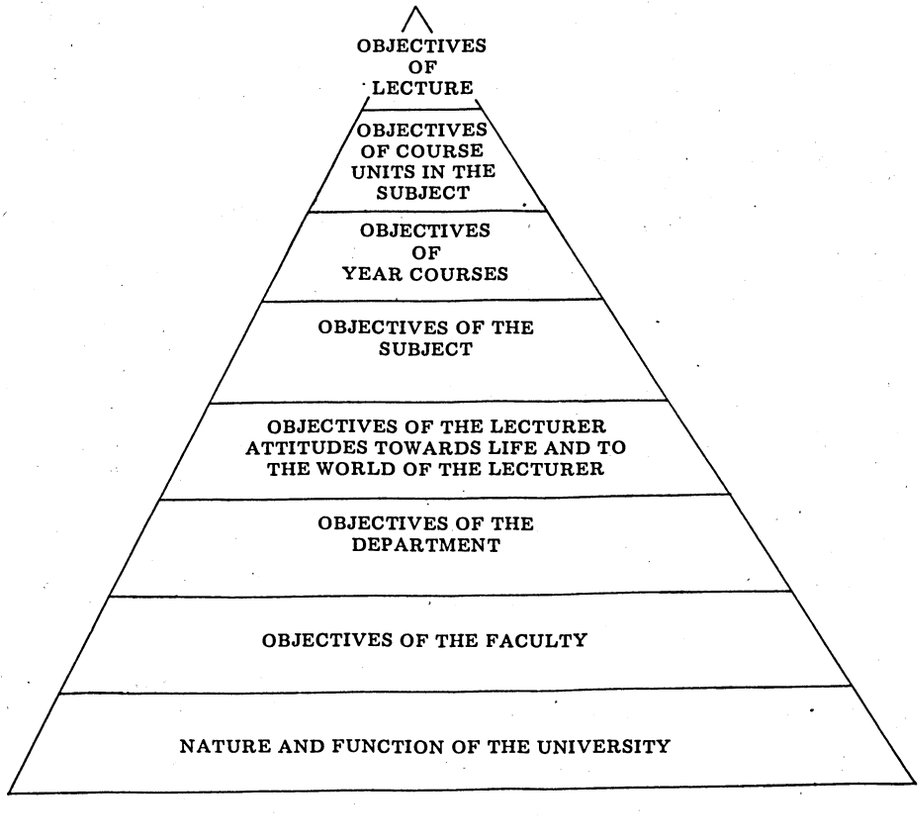

FIG. 2 — A hierarchy of aims (61, p. 207)

even though this is no guarantee that something has been learned. The lecturer's performance is also generally measured in terms of the number of lectures given[36]. Leary[38] poses the question whether the lecturer who possesses all the knowledge, but is a poor lecturer, is not possibly as "dangerous" as the lecturer who can deliver an excellent lecture, but does not know what he is talking about. Lecturing is an instrument, not an aim in itself.

The lecturer should be a manager of the learning environment. He should also realize that he can exert an important influence on the lives of people[23]. "Academic freedom" does not mean the freedom to lecture at pleasure, but as the conscience dictates[27]. It is easy to be a fraudulent lecturer as regards the content of the course and examination. De Graaf[19] maintains that a good lecturer should be a tradesman. A thorough knowledge of the subject is a necessary, but not sufficient condition for good teaching. If a lecturer manages to extend his knowledge and the knowledge of others he may be described as a productive scholar, but if he is able to share his knowledge with others he may be considered a productive lecturer[27]. There is not much difference between the knowledge of lecturers, but their efficacy differs considerably primarily because of the manner in which they impart knowledge and their relationship with the student[60]. However, we must also bear in mind that what passed for one student as a good lecture may be poor in the eyes of another.

THE STUDENT

The majority of agricultural students are typically rural in their philosophy and orientation, and unprepared for the hardships of the academic battle[11]. Of these students it will be expected to forget much of what they learnt on the farm and they find it particularly difficult to connect the abstract to the practice[16].

For purposes of accompaniment a distinction is made in education on the basis of the level of development of the "students" and reference is then made to the non-adults (pedagogics), the adults (andragogics) and the elderly (gerontagogics)[14]. The question then arises what category of individuals do we find in agricultural economic training at university. Cawood[14] differentiates the non-adults and the adults in the following manner:

(a) An adult attains adulthood - psychologically - when his conception of himself changes from one of dependence to one of independence.
(b) An adult has more experience which, incidentally, is of the greatest importance when a change is made from the lecture to more reading-up, simulation and case studies.
(c) The lapse of time between that which is learnt and the application thereof is shorter in the case of the adult.
(d) The authority relationship differs in the sense that an adult is a more independent and self-responsible individual.
(e) The adult has a greater responsibility in society.
(f) The adult is more involved with problem-solving.

When the above differences between the non-adult and the adult is used as the criterion, one comes to the conclusion that at the university one has to deal mainly with "near-adults". This means that the principles of pedagogy and andragogy are involved here. Although a discussion on the agogy as a science falls outside the ambit of this paper, interested persons are referred to Cawood[14] and Slabbert[61] for a comprehensive treatise on this matter.

To be able to understand this "near-adult", it is further necessary to have knowledge of where the student hails from, what motivated him to study agricultural economics, who counselled, why he came to university and what career he has in mind[39].

The student will make a success of his studies only if he is motivated whether it be extrinsically or intrinsically[61]. A prerequisite for this is a motivated lecturer.

In the final instance it is unfortunately true that the faculties of Agriculture and therefore also the departments of agricultural economics receive a high percentage of the weaker students[47]. This also has a clearly discernible influence on the teaching methods that are (ought to be?) followed.

WHAT IS OUR AIM WITH AGRICULTURAL ECONOMICS TRAINING?

In general, the student must be taught how to solve the present problems, but the heritage must also be preserved, otherwise we will make orphans of our students. Further, it must not be too contemporary for they must be enabled to anticipate the future[9]. We must therefore ensure that the training has relevance[71] [43]. The student must, therefore, develop a manner of learning and not merely build up a permanent core of knowledge[10].

The lecturer endeavours to make of the student a participant and not a spectator. We would wish to produce leaders and not dilettantes[19]. The student must therefore be taught to adopt a standpoint on matters affecting his field of study and for this we require lecturers who are trained thought-leaders.

According to Brownfeld[9] training which is based on capability and includes no value-system is defective. A process which teaches only crafts, conditions the student instead of initiating him and involves the teaching of facts (memorising) instead of logics (argumentation). The students must not be the product of a process of impressing, but must be taught to acquire insight and comprehension[15]. We should train not technicians, but analysts[1]. In management particularly, the training is frequently too technique-orientated[41].

The arguments as to whether the training should be theoretic or practical are well-known. According to Brinegar- it is not possible to give a practical course before the student is conversant with history, theory and statistical measuring and techniques of arriving at conclusions. However,

Walker[6]- maintains that one ought first to study the practice (and here the scenario has a role to fulfil), after which the underlying economic principles may be developed. It often happens that when students are engaged on their post-graduate study they express regret at not having a knowledge of the theory. On the other hand, agricultural economics as presented at university is often too abstract and complicated. The lecturers are so anxious to make an exact science of their subject that they insulate it from all reality by the employment of artificial assumptions. They then revel in this unauthentic environment by manipulating their extensive technical apparatus in an unending exhibition of meaningless exercises[40]. The origins of economics were as a "deductive" science and Conklin[17] believes that too little of the inductive approach is still perceivable today.

In the final analysis we wish to produce graduates who will be worthy ambassadors of their alma mater and of their field of study in particular. They must have pride in what they are and prove that they are worthy of the appellation "educated person".

PRESENTATION OF THE TUITION MATERIAL

During the Middle Ages, university teaching methods were centred around the lecture and the disputation. In the course of time the latter gave way to the seminar and the form of the lecture also changed[52]. Meanwhile further developments in teaching methods took place and according to Bligh[6] there are today no less than 29 methods of teaching.

The method of education used will depend, firstly, on the lecturer's personal abilities, his knowledge of the subject and his specific interests, and secondly on the student's competence to act and language capacity. In the third place the method will, of course, have to link up with the objectives of the specific subject. Other factors to be taken into consideration are the duration of the lectures and the other meeting situations, the specific content of a lecture, the sphere of interest and level of experience of the students, the level of knowledge of the students and the trust relationship existing between lecturer and student[61].

The method(s) used will depend, among other things, on whether the organisation of the learning process is linear or spiral. In the former case advancement is from the simple to the complicated, i.e. it is expected of the student to reproduce, to comprehend and to apply, followed by analysis, synthesis and evaluation. In the spiral approach, on the other hand, subjects are treated in cyclic manner. In each cycle the treatment of the subject becomes more intricate[35].

The decision as to which specific method(s) should be used, will depend on a variety of factors, such as the following (52, p. 107):

1. The nature of the objectives.
2. What must the student be capable of once he has completed the course?
3. The situation which must be created in order to help the student do that which he must do.
4. What tuition material is necessary for this purpose and how is it selected?
5. How is the organisation of the classes affected?
6. How does one determine whether the objectives have been attained?

According to Cawood[14] the following classification of teaching methods or didactic work-forms can be made:

General didactic methods	Specific didactic methods
1. Presentation (lecture or word method)	Reading; address; sermon; paper-reading; symposium; panel; forum; demonstration.
2. Conversation (discussion method)	Small-group discussion; question-and-answer technique; interviews; conferences.
3. Self-activity (independent study methods)	Study guides; self-activity modules; programmed education; projects; work groups; internship; remote teaching.
4. Experienced-directed methods	Simulation; acting; sociodrama; discussion of cases; laboratory teaching; in-basket activity.

It is clearly impossible to treat individually all the specific didactic methods. The discussion will be in terms of the general methods and will include a more detailed explanation of the relevant and less well-known particular methods.

1. The lecture

Because the lecture, and in particular the lecture reading, is still today the most general method of teaching, it will be discussed in somewhat greater detail. According to Cawood (14, p. 114) the advantages of the lecture method are summarised as follows by Hauptfleisch:

"• The communication of information not readily available;
- the teaching of theory contents (subject matter), if the available time or facilities are limited;
- introductory orientation to new knowledge contents or departure of information when new data are presented;
- it is an eminently-suitable method with which to accentuate the essential;
- for large-group education;
- as an introduction to other methods of education;
- the synthesising and summarising of knowledge as developed by means of other methods;
- to make known complicated terminology, concepts, conceptions and the subject's characteristic structure, and
- to awaken enthusiasm, inspiration and motivation for a field of study if the lecturer .... himself is inspired".

At the same time we are all aware of the fact that students assimilate tuition material at different

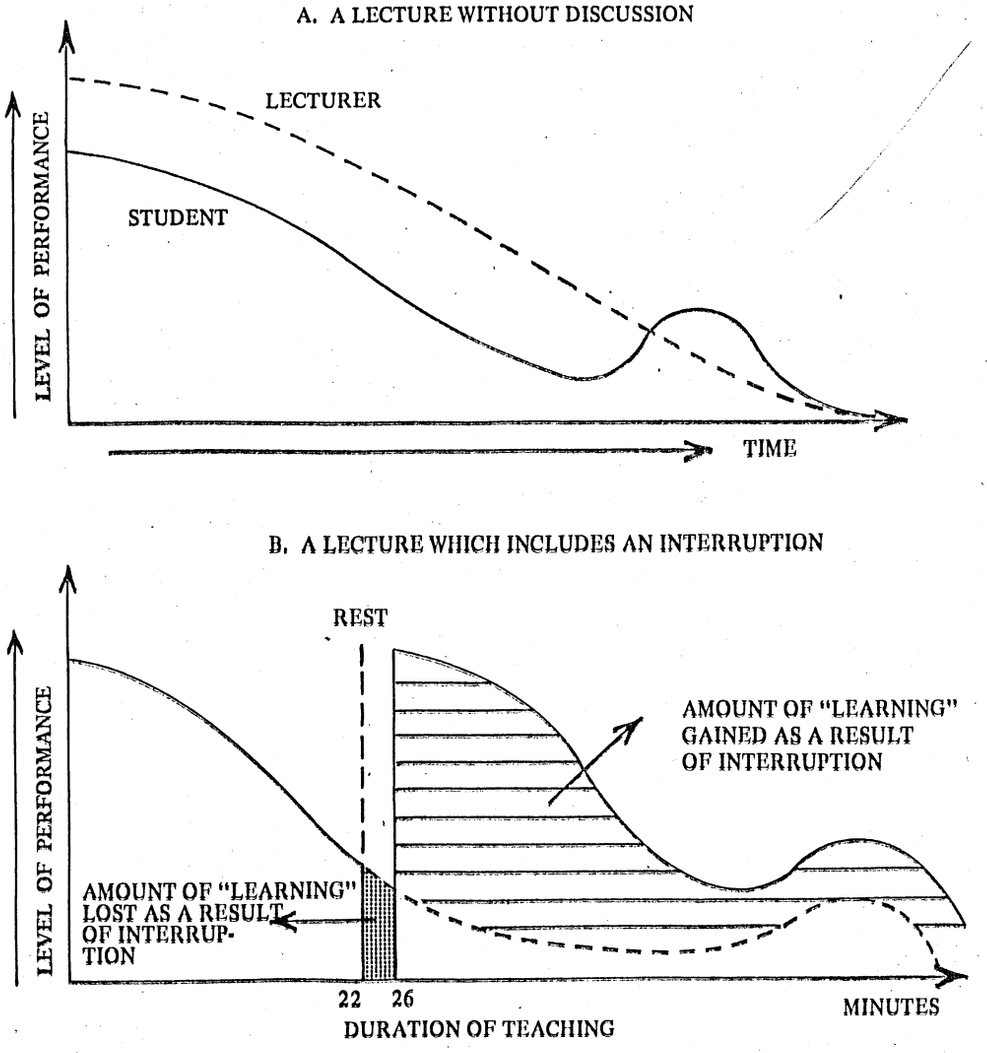

FIG. 3 – The relationship between the level of performance and duration of teaching (61, p. 236)

rates (in this connection see also the results of research as set out in Figure 3) and that they do so in different ways. Assimilation is determined, among other things, by factors such as motivation, perception, organisation, manner of presentation and active participation rather than by passive submission. Slabbert[61] maintains that the tempo of a lecture must be extremely slow for the students to find it too slow. Knowledge of these variables leads one to conclude that the established pattern of instruction in lecture-discussion groups of medium size, meeting at fixed times in conventional lecture rooms, results in a concentration of the training in a small homogenous minority. It is, therefore, a time-wasting and ineffective system of education of the heterogenous majority[29].

If the aim with education is the transmission and immediate reproduction of information, then the lecture is sufficiently effective; however, if the aim is the development of conceptions and problem-solving capabilities then the discussion class is the appropriate approach[59]. Laing[37] maintains that the most important disadvantage of the lecture-reading is the lack of back-feeding, and Cawood[14] says that if back-feeding does occur, the discussion sometimes dwells on aspects which do not interest a large group of the class; apart from this, the human memory is in any case fallible.

Of course, the lecture still has its place[29], but it is assumed that it is not an exercise in dictation. The students should be provided with a suitable text book or roneoed notes (or references which are readily available to all students). The lecturer, however, must not be a ventriloquist of the author because once the student has read the text, he need not attend the class(es) or if he does attend the class(es) he need not read the text[19].

2. The conversation

There are basically three forms of the conversation[61]:

(a) The Socratic form where the student makes an initial statement, he is then led to casting doubt on the statement, and subsequently he

acknowledges his ignorance of the correctness of his initial statement. Finally, the student formulates a correct statement. This method must be approached with circumspection as it can readily result in affective reactions on the part of the student.

(b) The leader-centred discussion where the lecturer initiates the discussion and regulates it, supplies information, encourages discussion and evaluates it.

(c) The group-centred discussion where the lecturer is not in the foreground, but forms part of the group.

The discussion methods and specifically the small-group method have in the past decade enjoyed increasing attention particularly in andragogy[5]. Riemenschneider[54] maintains that more use should be made of this method. According to Alsberg[1] the students learn more from one another than from the lecturers. Kendrick[33] maintains that it is also advisable that the group come to only one decision on a specific question, as each member will wish to see his standpoint upheld and this will teach them to put their viewpoint over convincingly. Miles[44] is against this method, maintaining that it can lead to conformism, manipulation, passive agreement and mediocrity. This happens particularly if the groups are too large[62]. According to Cawood[14], experience .... i.e. a large measure of adulthood .... is a prerequisite for the successful application of the (small-)group discussion. This will, of course, be the case to an even greater degree.

3. Self-activity

With the expansion of the number of students the effectiveness of the lecture is open to doubt[49] and the costs of lecturer-time rise to "library-time"; we should therefore substitute reading by the student for lectures by the lecturer[57].

In this method the emphasis is on independent work, creative thought and learning by discovery[14]. According to Wynn[72] the tuition-content may be programmed or not. This method of teaching is applied either by means of programmed text books and/or is computer-assisted or controlled. In the first-mentioned case progress is made in so far that the method also presents the tuition material, while the last-mentioned merely checks on the student's progress[53].

Programmed teaching can be presented in one of two ways, namely the linear way which agrees to a certain extent with the linear organisation of Kropp[35] as previously mentioned, or it can be the "branching" type which involves additional remedial steps and provides for possible errors on the part of the student[12].

Clark[16] maintains that repetition ("over-lecturing") is unfortunately necessary in the teaching of abstract subjects because much of what is learnt is not applied immediately or continuously. According to Hardin[27] programmed teaching coupled with audio-visual aids is a good substitute for the drudgery of repetition in undergraduate courses.

Hammonds[26] states that programmed teaching is aimed more at the quiet obtaining of knowledge and he suggests that the so-called "guided analysis" is aimed more at problem-solving[51]. In programmed teaching the students progress in small mental steps from one question to another without the addition of contradictions, while in guided analysis the steps are initially small and slowly grow bigger until the student connects the individual problem into a complete problem, which in effect then represents a case study.

A new development in independent study is the self-activity module[14] which includes written and other instructions; the student presents himself for evaluation once he has carried out all his duties. This method is presently in use at a large number of universities in the USA.

In the USA and Germany there is a movement away from the simulated to the actual work experience, in other words a type of internship. Text-book concepts acquire more meaning when experienced and studied in the real world and if theoretic conceptions have any meaning at all they are also practically useful[66]. The student must see and realize what the entrepreneur is actually doing[63]. The student's life then consists of word - study - work and not vacation (work) - study - vacation (work)[24]. This means that the teaching can concentrate on "tomorrow" and can develop the thinking process[45], because provision is being made for "today" through work experience. The graduate then possesses certain crafts which make him fairly usable. The student is thereby drawn onto the operational level, something that a case study, however good it might be, cannot do. The student should be able to apply his knowledge in a non-static and non-*ceteris paribus* world[30]. This will also partially eliminate the problem that too much attention is devoted to planning processes and too little time to the implementation of control thereof[7].

4. Experience-directed method

"Experienced-directed methods are those in which all the three general didactic work forms are integrated, but where discussion and self-activity methods feature more strongly than the lecture method[14]". Here, experience is of particular importance.

Teaching of management can, except for the actual work experience, possibly be carried out most effectively by means of a management game, but in that case the examples must not be foreign to the student[13].

Through a management game the student learns the following[14]:

(a) To formulate objectives. Traditional teaching methods devoted attention to this aspect only in passing.

(b) Recognition and definition of problems and opportunities. Too many courses follow the "fire-extinguishing" approach. A management

game can also serve to make the dull subject of record and bookkeeping more relevant and lively.

(c) Perception and isolation of relevant information. Students frequently suffer from information-daze and by means of a management game they learn to crawl before they walk.

(d) Decision-making. The theoretical training follows the analytic approach, but in real life the approach to decision-making is heuristic. It should include strategic (long-term), tactical (medium-term) and operational (short-term) decisions[4].

(e) Action and acceptance of responsibility, something that cannot be done by means of conventional teaching methods.

The so-called "telelecture" probably offers the best possibilities for the present. It involves the use of films (or videotapes), colour slides and transparencies to explain the various (farm) situations, with, simultaneously, telephone interviews with entrepreneurs such as farmers and co-operative managers, or also with other universities in order to cover a larger geographic area and possibly to obtain different standpoints[28]; this is probably cheaper than the exchange of lecturers between universities suggested by Sen.[58] Students ought, where possible, to be encouraged to visit various universities[1].

EVALUATION OF STUDENTS

In a narrow sense evaluation means testing, examining, judging of students' work or allocation of marks[64] or product evaluation[20]. Evaluation in the broad sense can be regarded as quality control with a view to account[64], in other words a process valuation[20]. The first-mentioned concerns chiefly the student while the last-mentioned rather concerns the lecturer.

In didactics a teaching model is used which represents the connection between evaluation and the other basic conceptions (see Figure 4).

due consideration of the objectives, a distinction should be made between what the student:

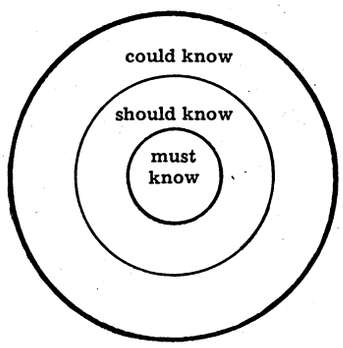

FIG. 5 – Distinction between core and complementary facts (64, p. 16)

The mark-allocation scheme in evaluation should take into consideration the requirements as set out in Figure 5. For example, if a basic fact is furnished in the answer, +5 marks are awarded; if it is not present, should no points then be awarded? Is the same argument valid as regards a complementary fact which is worth, say +1 if it is present? What happens should the student make a nonsensical statement which indicates that he does not follow the subject of a question while the rest of the question indicates the opposite?

These and many other problems give rise to the following questions:

1. How effective is the testing? Testing can be formal or informal, where the former refers to the test or examination and the latter to, for example, the seminar[64]. According to Beard[3] formal testing, as it is functioning conventionally at our universities, is ineffective because it has minimal feed-back value. Should not the lecturers devote more attention to the drawing-up of draft answers which are given to the student together with the mark-allocation scheme when the tests are returned? Is this possible with the so-called long questions?

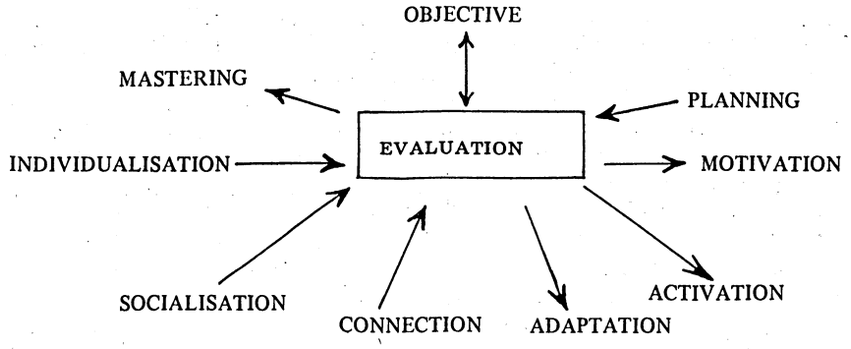

FIG. 4 – The relationship between evaluation and other basic conceptions in a didactic thinking-system (64, p. 13)

Evaluation in a narrow or broad sense is connected with each of the other nine facets of a teaching organisation as mentioned in Figure 4. It is of especial importance that the evaluation of the student takes place in agreement with the purposes of a specific course. In evaluation, and again with

2. How reliable, valid and exact is the evaluation? According to Swartz[64] there is overwhelming evidence against the reliability of long-question tests. The point at issue is mainly objectivity, which arises especially (but not exclusively) during the correction of long

questions. During the past few years the idea of the so-called objective short-question test has received increasing attention; here the correcting may be standardised or mechanised. Examples of this is the manifold-choice question, the pairing question, the sentence-completion question and the selection question[64]. The advantages of such a system are evident, while the most important disadvantage is that it discourages creative thought. It is, on the other hand, frequently maintained that training should be aimed at teaching the student to think, but the test and examination questions do not always reflect this.

Other aspects which ought to be taken into consideration in student evaluation are briefly the following:

1. Is it not logical to include in the examination only extracts from the whole subject.
2. An examination ought not to be a test of the student's nerves by the inclusion of shock questions.
3. If we wish to test insight and application, such test must not degenerate into a memory test. Csehi and Szekely[1]- state that it is especially important that the student's ability be tested to apply his knowledge to problems which were not treated in the classroom.
4. It does not serve a purpose to test the student's mastery while for the lecturer it is a matter of his stamina in correcting the test. Wills[70] maintains that the primary objective of examining is to check on the lecturer's effectiveness by determining how well or badly the student comprehends the tuition material.
5. It is unfair if the students do not have the slightest idea of what they can expect in the test or examination.

A specific technique of examining which should receive further attention is the open-book examination. What about a system where the students pull their test-questions out of a hat and are then given, say, three hours to answer the question wherever they wish and with whatever sources they wish to consult[64]?

The precision with which examinations can be measured is another important dimension. Without going into detail, we must realize that a test mark cannot be anything other than an approximation digit. Evaluation can be qualitative, quantitative or in order of precedence. Once the examination papers have been marked a value determination can be made regarding whether the student should pass or not[42]. It is especially important to draw up a mark scheme for long questions if the questions are primarily factual, while the quality is sought in the answers.

There are basically four methods for the marking of examination papers[64]:

1. The adding method can be used only where every item of information or fact is awarded a mark as correct or incorrect, independently of the examiner's opinion.
2. The arrangement method, where the students are placed in order of merit. This method can be used for any form of academic work .... also where the adding method cannot be employed. The problem with this method is that it can be used only in respect of small numbers.
3. The method of qualitative grading, where students are classified into, say, five grades (A, B, C, D and E). This method provides a relative standard based on the achievement of average groups of students rather than on absolute standards. The most important disadvantage of this method, even when the "normal curve" approach is followed, is that the grading is always relative to the group of students.
4. Numerical evaluation or a mixture of numerical evaluation and the adding method is used where the student's achievement is expressed as a percentage of that which is expected of him. The problems with this method is that the lecturer's evaluation is probably based on the student's results in the past (and is therefore relative) and also that it is difficult to differentiate between 14/20 and 13/20 and impossible to do so between 70/100 and 69/100.

A further problem arises when the examination marks have to be added up where different lecturers are involved. The examiners can be strict to a greater or lesser degree and the examination papers can be difficult to a greater or lesser degree, and the lecturer can have conveyed the material well or less well. How is this problem to be overcome?

EVALUATION OF LECTURERS

Except for a few remarks made previously as regards the lecturer, Slabbert[61] provided an extensive exposition of the characteristics that should be possessed by the lecturer. The characteristics of an ideal lecturer may briefly be summed up as follows: Physical and spiritual vitality, freedom from neurotic tendencies, unprejudiced, discerning, resourcefulness, firmness, good humour, sympathetic, tolerant, tact, friendliness, teachable, loyal, high ideals, modesty, bravery, open-heartedness, patience, consistent, unselfishness, sophisticated, self-controlled, imaginative, enthusiastic and many more characteristics and synonyms besides. In truth, a practically impossible test to pass!

The Department of Agricultural Economics at the University of Stellenbosch has for the past few years followed a system whereby the students at the end of each quarter complete a questionnaire which refers to the lecturer's ability in lecturing, his justness, the content of the course and many other relevant matters. Experience has shown this to be a useful procedure and Koch[34] recommends that a system of lecturer-evaluation be introduced.

A system of lecturer-evaluation, where promotion depends on such an evaluation, can give rise to problems. In certain cases at universities in the USA this led to a lowering of standard, albeit usually temporary. The question is also frequently

asked whether the student really knows enough to be able to adjudge. That which is at issue here, however, is what the student thinks and, therefore, the correction of false impressions where these occur.

In conclusion it may be mentioned that Kendrick[33] holds the (cynical) view that a requirement for effective teaching is a lazy lecturer! In his view the large degree of automation and self-learning methods presently being incorporated in the learning process, render it too impersonal and the lazy lecturer cannot bring himself to do it. In the true tradition of the lecturer it has therefore been decided not to discuss the (to agricultural economists) well-known didactic methods such as the "field visit" and case studies as well as the lesser known methods such as the scenario and in-basket activities.

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