

What roles do teachers have in supporting the learning of the modern-day student?

Eli Bitzer
Centre for Higher and Adult Education
Faculty of Education
University of Stellenbosch
Email: emb2@sun.ac.za

Introduction

My invitation to present a paper at this conference offered me a learning opportunity for which I am immensely grateful. Not knowing much about Agriculture education, a tour of virtual Agriculture sites assisted me in gathering new perspectives on the Agriculture industry and Agriculture education that I did not have before.

For instance, the University of California at Davis's programmes on sustainable Agriculture (<http://www.sarep.ucdavis.edu>) made extremely interesting reading. This, in turn, led me to the website of the American Department of Agriculture's section on education and training resources (<http://www.agclassroom.org>) where a variety of teaching resources are available with ideas on Agriculture science projects, lesson plans and, most interestingly, virtual field trips and agricultural experiments on the Mir space station!

Then I turned to a few African sites. Here I discovered interesting views and information on issues such as urban agriculture, exploring the phenomenon of cultivating food crops and the keeping of small livestock in open spaces around cities in Eastern and Central Africa. An article by C J Savio from the "Cities Feeding People" project (<http://www.idrc.ca/cfp>) points to possibilities of utilising urban agriculture as a potential partial solution to the problem of rapid urbanisation in Africa.

A visit to the South African National Department of Agriculture's website rendered interesting information on new legislation in Agriculture, and the latest agricultural forecasts and research, but very little information on education in Agriculture. Even the links to provincial departments of Agriculture did not prove to be much different from, and definitely less active in the field education than, most of their American and European counterparts.

From the information on the worldwide web it appeared to me that Agriculture practices have changed dramatically, especially since World War II. In many parts of the world food and fibre productivity seem to have soared as a result of new technologies, mechanisation, increased chemical use, specialisation and government policies that favoured maximising production. Although these changes appear to have had many positive effects and have reduced many risks in farming, there also seem to have been significant costs. Prominent among these are topsoil depletion, groundwater contamination, the decline of family farms, continued neglect of the living and working conditions of farm workers, increasing production costs, and the disintegration of economic and social conditions in rural communities.

A number of websites mention that a growing movement has emerged during the past two decades to question the role of the agricultural establishment in promoting practices that

contribute to these social problems. Apparently the movement for sustainable agriculture is garnering increasing support and acceptance within mainstream agriculture. Sustainable agriculture appears to integrate three main goals - environmental health, economic profitability, and social and economic equity. Sustainability rests on the principle that the needs of the present must be met without compromising the ability of future generations to meet their own needs. Therefore, stewardship of both natural and human resources are of prime importance in Agriculture. This is exactly where education and excellence in the teaching of Agriculture are important systemic elements that can make significant contributions.

My original title for this paper was "*The role of the teacher in supporting the modern-day student*", but in reflecting on what I wished to talk about, I decided that I now have fewer, but hopefully better answers than when I started my teacher training and staff development work in higher education over 20 years ago. So I have changed the title to "*What roles do teachers have in supporting the learning of the modern day student?*" I put my title in a question form, since the "modern-day student" is exposed to information technologies and an abundance of information in almost any conceivable field. While the teacher of yesterday had most of the answers, it appears that different roles are expected from the modern-day teacher. Teachers do not have all the answers any longer. They can hardly keep up with the rapid increase in information, have to operate in fast-changing environments and, sadly, have not been properly trained or prepared to teach in a new higher education environment.

Accordingly, I have structured the rest of my paper into four sections. The first addresses the gradual shift in higher education from an emphasis on teaching to an emphasis on learning. The second highlights the research of a group of higher educationists from the USA who presented us with seven principles for good practice in undergraduate education. Thirdly, the paper elaborates on the UNESCO-affiliated International Academy of Education's (IAE) synthesis of guidelines for effective teaching that emerged from educational research, and lastly, I pose a number of questions in order to prompt answers to the basic question posed in the title of the paper.

The shift from teaching to learning

One of the most significant publications in the past decade on teaching and learning in higher education is an article by Robert Barr and John Tagg (1995) published in *Change*, a leading journal on new issues in higher education. In their article they draw attention to the fundamental shift in assumptions and views about teaching and learning that have taken place lately. According to them, educational institutions should no longer offer teaching, but should instead produce learning results. In addition to an emphasis on outcomes/output-driven teaching, there would be numerous other implications if teaching programmes were to adopt a learning- and learner-centred approach. Table 1 lists some of these implications in the areas pointed out by Barr and Tagg. These include institutional mission statements, quality criteria, teaching structures, learning theories, finance and the roles of educators/lecturers.

Table 1

The shift from teaching to learning

TEACHING PARADIGM	LEARNING PARADIGM
MISSION AND OBJECTIVES	
<ul style="list-style-type: none"> • Presents/provides teaching • Conveys knowledge • Offers programmes and courses • Improves teaching quality • Ensures access to teaching 	<ul style="list-style-type: none"> • Produces learning • Promotes discovery and construction of knowledge • Creates powerful learning environments • Improves learning quality • Achieves success through learning
MEASURES OF SUCCESS	
<ul style="list-style-type: none"> • Inputs, resources • Quality of students being admitted • Curriculum development, expansion • Quantity and quality of resources • Student numbers, growth in profit • Quality of lecturers, teaching, narrow evaluation results 	<ul style="list-style-type: none"> • Learning and success outcomes • Quality of student stimulation • Development of learning techniques, expansion • Quantity and quality of outputs • Growth of learning, effectiveness • Learning quality, broad evaluation results

TEACHING-LEARNING STRUCTURES	
<ul style="list-style-type: none"> • Atomistic, parts before the whole • Time remains constant, learning varies • Periods, course structures • Teaching always starts and ends at the same time for everybody • One teacher, one classroom • Independent disciplines, departments • “Covers” material, contents • Final evaluation of learning • Grading by educators/lecturers • Evaluation is confidential • A qualification = Credit hours accumulated 	<ul style="list-style-type: none"> • Whole picture, the whole before the parts • Learning stays constant, time is variable • Creation of learning environments • Learning starts and ends at different times for different purposes • Learning experiences in accordance with learning objective • Interdisciplinary cooperation between departments • Specific learning results • Evaluation before, during and after learning • External evaluation of learning • Evaluation is 'open'/occurs openly • A qualification = Demonstrated knowledge & skills
LEARNING THEORIES	
<ul style="list-style-type: none"> • Knowledge is 'out there' • Knowledge comes in bits and pieces and is “conveyed by teachers • Learning is cumulative and linear • Learning can be compared to the storage of knowledge • Learning is controlled by teachers • Physical proximity is necessary for effective learning • Learning is competitive and individualistic • Talent and ability are found only in some 	<ul style="list-style-type: none"> • Knowledge exists 'on the inside' and is shaped by individual experience • Knowledge is constructed, created and acquired • Learning is an inter-linking and interaction of networks • Learning can be compared to learning to ride a bicycle • Learning is managed and directed by learners • Active learners are necessary, but the physical presence of the teacher is not necessarily a prerequisite • Learning environment is cooperative, collaborative and supportive • Talent and ability are generally present

PRODUCTIVITY/FINANCE	
<ul style="list-style-type: none"> • Productivity is defined in terms of cost per lesson hour per learner • Finance is input-driven; based on hours/periods taught 	<ul style="list-style-type: none"> • Productivity is defined in terms of learning units per learner • Productivity is output-driven; learning outcomes and results are important
NATURE OF ROLES	
<ul style="list-style-type: none"> • Educators/lecturers convey knowledge • Educators/lecturers and students function independently and in isolation • Educators/lecturers grade and classify students • Only educators/lecturers may 'lecture' • Any expert may teach 	<ul style="list-style-type: none"> • Educators/lecturers design the learning process and learning environment • Educators/lecturers and students form a learning community • Educators/lecturers develop the ability and talents of students • All staff help ensure learning outcomes and success • Learning empowerment is challenging and complex

(Adapted from Barr & Tagg, 1995)

According to Barr and Tagg a “paradigm” represents the underlying values and assumptions on a particular issue, in this case teaching and learning. As can be seen from Table 1, this shift (transformation) in teaching has numerous and far-reaching implications for teaching and educational institutions. Although the shift will probably take time to become established in any way, it is a force to be reckoned with if educational institutions want to keep abreast of international trends in what is becoming an increasingly international job market. In this respect, Barr and Tagg (1995:13) say the following (my emphases):

*“In its briefest form, the paradigm that has governed our colleges in the past is this: A college is an institution that exists **to provide instruction**. Subtly but profoundly we are shifting to a new paradigm: A college is an institution that exists **to produce learning**. This shift changes everything. It is both needed and wanted. ... [W]e are beginning to recognize that our dominant paradigm mistakes a means for an end. It takes the means or method – called “instruction” or “teaching” – and makes it the college’s end or purpose. To say that the purpose of the college is to provide instruction is like saying that General Motors’ business is to operate assembly lines or that the purpose of medical care is to fill hospital beds. We now see that our mission is not instruction but rather that of producing **learning** with every student by **whatever** means work best.”*

Another factor that compels educators (in South Africa at least) to reconsider the way in which they approach their teaching practices are the so-called *critical crossfield learning outcomes* of

the National Qualifications Framework (see Table 2).

Table 2

Critical Crossfield (Generic) Learning Outcomes

<p><i>In all learning areas, learners should be able to demonstrate their ability to:</i></p> <ul style="list-style-type: none">• <i>Communicate effectively using visual, mathematical and/or language skills in the modes of oral and/or written presentation;</i>• <i>Identify and solve problems by using creative and critical thinking;</i>• <i>Organise and manage themselves and their activities responsibly and effectively;</i>• <i>Work effectively with others in a team, group, organisation and community;</i>• <i>Collect, analyse, organise and critically evaluate information;</i>• <i>Use science and technology effectively and critically, showing responsibility towards the environment and the health of others;</i>• <i>Understand that the world is a set of related systems. This means that problem-solving contexts do not exist in isolation.</i>

(National Qualifications Framework, 1997)

These generic learning outcomes are applicable to qualifications at all levels of education and training and have to be assessed within the context or field in which the learning takes place. So much for paradigm shifts and generic competence requirements.

A further question I would like to explore is what research on teaching and learning revealed to us during the past decade. Are there generic findings that might be useful for all educators - in keeping with modern-day student learning needs and regardless of the field of higher education they teach? Do these findings tell us enough to be useful in defining our roles? Does research help us to make the shift from the teaching to the learning paradigm?

Seven principles for good undergraduate teaching practice

In a study supported by the American Association for Higher Education, the Education Commission of the States and the Johnson Foundation (Chickering, Gamson and Barsi, 1989), a number of “principles for good practice in undergraduate education” were developed through an extensive research process at a range of higher education institutions in the USA. I highlight each of these principles briefly.

Principle 1: Good practice encourages student - teacher contact

Contact between teachers and students in higher education (both in and out of classes) is the most important factor in student motivation and involvement. Concern for students helps them to get through rough times and to keep on working and learning. Knowing a few teachers well enhances students’ intellectual commitment and encourages them to think about their own values and future plans.

Principle 2: Good practice encourages cooperation among students

Learning is enhanced when it is more a team effort than a solo race. Productive learning, like productive work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing of ideas and responding to others’ reactions improves thinking and deepens understanding.

Principle 3: Good practice encourages active learning

Learning does not take place by only sitting in classrooms and listening to teachers, memorising pre-packaged material and providing answers to questions. Students must talk about what they are learning, write about it, relate it to past experiences and apply it in their daily lives. They must make what they learn part of themselves and make meaning for themselves from that.

Principle 4: Good practice gives prompt feedback

Knowing what you know and don’t know focuses learning. Students need appropriate feedback on performance to benefit from programmes. In getting started, students need help in assessing existing knowledge and competence. In classes, students need frequent opportunities to perform and receive suggestions for improvement. At various points during their learning experience at college they need opportunities to reflect on what they are learning, what they have learnt and what they still need to learn.

Principle 5: Good practice emphasise time on task

Time plus energy equals learning. There is no substitute for spending time on learning tasks. Learning to use one’s own time well is critical for students and professionals alike. Students need help in learning effective time management. Allocating realistic amounts of time means effective learning for students and effective teaching for teachers. How an institution defines time expectations for students, teachers, administrators and other professional staff, can establish the basis for high performance for all.

Principle 6: Good practice communicates high expectations

Expect more and you will get more. High expectations are important for everyone - for the poorly prepared, for those unwilling to exert themselves, and for the bright and motivated. Expecting students to perform well becomes a self-fulfilling prophecy when institutions and teachers hold high expectations for themselves and make extra efforts.

Principle 7: Good practice respects diverse talents and ways of learning

There are many roads to learning. People bring different talents and styles of learning to higher education. Brilliant students in the seminar room may be all thumbs in the lab or studio. Students

rich in hands-on experience may not do so well with theory. Students need opportunities to show their talents and learn in ways that work for them. Then they can be pushed to learning new ways that do not come easily.

The study also emphasised that good education practices like those described by the “seven principles” have a much better chance to be achieved if the environment in which they are expected is conducive to education. What qualities must such an environment have? The study identified five environmental factors that appear to be crucial:

- A strong sense of shared purposes
- Concrete support from administrators and leaders for those purposes
- Adequate funding appropriate for the purposes
- Policies and procedures consistent with the purposes
- Continuing examination of how well the purposes are being achieved

There is good evidence that such an environment can and should be created. When this happens, teachers and administrators tend to think of themselves as educators. The sources of support and influence can encourage environments for good practice in undergraduate education by :

- setting policies that are consistent with good practice;
- holding high expectations for institutional performance;
- keeping bureaucratic regulations to a minimum that is compatible with public accountability;
- allocating adequate funds for new programmes and the professional development of teachers, administrators and support staff;
- encouraging the employment of under-represented groups among teaching staff, administrators and support staff;
- providing the support for programmes, facilities and financial aid necessary for good practice in undergraduate education.

The study from which the “seven principles” were derived also provided educationists with two published inventories - one for self-evaluation by individual teachers and one for institutional self-evaluation. It seems obvious that principles such as these should be translated into specific contexts to be useful. It also appears that the principles need a conducive environment to be of maximal use.

Guidelines for effective teaching offered by the International Academy of Education

Another set of useful teaching guidelines emanated from the work of the International Academy of Education (IAE). The mission of the IAE (<http://www.ibe.unesco.org>) is to foster scholarly excellence in all fields of education. As part of its mission, the IAE provided timely synthesis of research on educational topics of international importance. As one of its projects, a series of publications have been made available to educators worldwide to adapt and utilise for their particular contextual needs. One such publication, edited by Jere Brophy (n.d.), represents a synthesis of research that has emerged from environments that support effective teaching practices. Much of the support for the guidelines provided by Brophy does not only come from studies on relationships between classroom processes and student outcomes, but also from examples of excellent instructional design and emerging theories on teaching and learning. Although most of the guidelines were developed from the schooling environment, they are very

applicable to higher education and might be considered to improve practice in the modern-day teaching environment.

Guideline 1: A supportive learning climate (Students learn best within cohesive and caring learning communities.)

Research by Good & Brophy (2000) and Sergiovanni (1994) points out that productive contexts for learning feature an ethic of caring that pervades teacher/student interactions and transcends gender, race, ethnicity, culture, socio-economic status, disadvantaged conditions and all other individual differences. Teachers should expect students to manage learning materials responsibly, participate thoughtfully in learning activities and support the personal, social and academic well-being of all members of the learning community.

Guideline 2: The opportunity to learn (Students learn more when most of the time available is allocated to curriculum activities and the classroom management system emphasises maintaining their engagement in those activities.)

Research indicates that teachers who approach their teaching as creating an effective learning environment tend to be more successful than teachers who emphasise their role as disciplinarians (Brophy, 1983; Denham & Lieberman, 1980; Doyle, 1986). Effective teachers do not need to spend their time responding to behaviour of students since they manage the learning environment in such ways as to elicit student co-operation and engagement in learning activities. Successful teachers tend to communicate clear expectations, create smooth transitions among learning tasks and activities and follow through with any needed cues or reminders.

Guideline 3: Curricular alignment (All components of the curriculum are aligned to create a cohesive programme for accomplishing instructional purposes and goals.)

Research by Beck and McKeown (1988), Clark and Peterson (1986) and Wang, Hartel and Walberg (1993) points out that educational policy-makers, textbook publishers and teachers often become so focused on content coverage or learning activities that they lose sight of the larger purposes and goals that are supposed to guide curriculum planning. Teachers typically plan to cover the content or achieve learning outcomes with students without giving much thought to the goals and the broad learning outcomes of programmes. As a result of ever-increasing content demands, too many topics are covered, with the result that learning activities often lack coherence and is cluttered with insertions. Skills and attitudes are taught separately from knowledge content rather than integrated with it. In general, neither the students' texts nor the questions and activities suggested in learning materials are structured around powerful ideas connected to important goals.

Guideline 4: Establishing learning orientations (Teachers can prepare students for learning by providing an initial structure to clarify intended outcomes and cue desired learning strategies.)

Studies by Ausubel (1968), Brophy (1998) and Meichenbaum and Biemiller (1998) indicate the value of establishing a learning orientation by starting learning activities with advance organisers or previews. These introductions facilitate students' learning by communicating the nature and purpose of activities, connecting it to prior knowledge and cueing the kinds of student responses that activities require. This helps students to remain goal oriented, it stimulates motivation to learn and helps students to appreciate the value or application potential of the learning outcomes.

Guideline 5: Coherent content (To facilitate meaningful learning and retention, content is developed with emphasis on its structure and connections.)

Research findings from Beck and Mckeown (1988), Good and Brophy (2000) and Rosenshine (1968) emphasise that networks of connected information structured around powerful ideas can be learned with understanding, and retained in forms that make them accessible for application. In contrast, disconnected bits of information are likely to be learned only through low-level processes such as rote memorising, and most of these bits are either soon forgotten or are retained in ways that limit their accessibility. Similarly, skills are likely to be learned and used effectively if taught as strategies adapted to particular purposes and situations, with attention to when and how to apply them. Students may not be able to integrate and use skills that are learned only by rote and practised only in isolation from the rest of the curriculum.

Guideline 6: Thoughtful discourse (Questions are planned to engage students in sustained discourse structured around powerful ideas.)

Besides presenting information and modelling application of skills, effective teachers seem to structure significant discourse on learning content. They use questions to stimulate students to process and reflect on content, to recognise relationships among key ideas and the implications of such ideas, to think critically about the relationships among ideas, and use it in problem solving, decision making or other high-order applications (Good and Brophy, 2000; Newmann, 1990 and Rowe, 1986). Discourse is not limited to eliciting short answers to miscellaneous questions. Instead, it features sustained and thoughtful development of key ideas. Through participation in such discourse, students construct and communicate content-related understandings. In the process, they abandon naïve ideas or misconceptions and adopt the more sophisticated and valid ideas embedded in educational goals.

Guideline 7: Practice and application activities (Students need sufficient opportunities to practise and apply what they are learning, and to receive improvement-oriented feedback.)

There are three main ways in which teachers help their students to learn. First they present information, explain concepts and model skills (Cooper, 1994). Second, they ask questions and lead their students in discussion and other forms of discourse surrounding the content (Knapp, 1995). Third, they engage students in activities or assignments that provide them with opportunities to practise or apply what they are learning (Brophy and Alleman, 1991; Dempster, 1991). There are good indications (Brophy and Alleman, 1991; Cooper, 1994; Dempster, 1991; Knapp, 1995) that skills practised to a peak of smoothness and automaticity tend to be retained indefinitely, whereas skills that are mastered only partially tend to deteriorate. Most skills are learned best when practice is distributed over time and embedded within a variety of tasks. Thus, it is important to follow up on through initial teaching with occasional review activities and with opportunities for students to use what they are learning in a variety of application contexts.

Guideline 8: Scaffolding students' task engagement (Teachers provide whatever assistance students need to enable them to engage in learning activities productively.)

Research on learning tasks (Brophy and Alleman, 1991; Rosenshine and Meister, 1992; Shuell, 1996; Tharp and Gallimore, 1988) suggests that activities and assignments should be sufficiently varied and interesting to motivate student engagement, and sufficiently new or challenging to constitute meaningful learning experiences rather than repetition. The effectiveness of assignments is enhanced when teachers first explain and use practice examples with students before releasing them to work independently. The availability of teachers to monitor progress and render help when needed is crucial in learning success. The principle of teaching within students' zones of proximal development (Vygotsky, 1993; Williams, 1989) implies that they will need structure and scaffolding at some stage in the teaching-learning process, but also that teacher structure and scaffolding will be faded as the students' expertise develops. Eventually,

students should become able to use what they are learning autonomously and to regulate their own productive task engagement.

Guideline 9: Cooperative learning (Students often benefit from working in pairs or small groups to construct understandings or help one another to master skills.)

Research by Bennett & Dunne (1992), Johnson & Johnson (1994) and Slavin (1990) indicates that there is much to be gained by requiring students to collaborate in small groups or in pairs when they work on learning tasks or assignments. Cooperative learning promotes affective and social benefits such as increased student interest in valuing of subject matter, and increases in positive attitudes and social interactions among students who differ in gender, race ethnicity, achievement levels and other characteristics.

Cooperative learning also creates the potential for cognitive and meta-cognitive benefits by engaging students in discourse that requires them to make their task-related information-processing and problem-solving strategies explicit (and thus available for discussion and reflection). Students are likely to show improved achievement outcomes when they engage in certain forms of cooperative learning as an alternative to completing assignments on their own.

Guideline 10: Goal-oriented assessment (Teachers use a variety of formal and informal assessment methods to monitor progress toward learning goals or set learning outcomes.)

A well-developed curriculum includes strong and functional assessment components. These assessment components are aligned with the goals of the curriculum and so they are integrated with its content, methods for learning facilitation and designed to evaluate progress towards its major intended outcomes. Research by Dempster (1991), Stiggins (1997) and Wiggins (1993) shows that comprehensive assessment does not just document students' ability to supply acceptable answers to questions or problems; it also examines the students' reasoning and problem-solving processes. Effective teachers routinely monitor their students' progress in this fashion, using both formal and informal assessment opportunities to provide feedback to students on their progress towards learning goals.

To date, most research on teaching and learning has been conducted in the United States, Canada, Western Europe and Australasia. Consequently, the degree to which findings apply to other countries - particularly countries in Africa - has yet to be addressed. There are indications, however, that teaching and learning is much more similar than different across countries and cultures. To me it seems only logical that the "principles" and guidelines identified through research and practice still require adaptation to local systems and contexts, taking into account student cultures and resource limitations.

Conclusion

I want to conclude by posing a number of questions that relate to the issues I have tried to bring to your attention. Of course it would be impossible to answer positively to all of them, but at least it might help you to reflect upon what you try to achieve and how you want to improve on your teaching.

Firstly, have you accepted at your institution the international phenomenon in higher education - and at all levels of education for that matter - that there should be a shift from teaching to learning? A shift from an emphasis on the quality of input to an emphasis on output and process? How has this affected your institution? How has this affected your own philosophy of teaching and the way you have taught in the past three years? Can you describe your

educational roles in terms of the learning paradigm or are you still mainly operating in the teaching paradigm?

Secondly, have you thought about and actively and productively integrated generic learning outcomes in your curricula and programmes of learning? Have you made these outcomes part of the learning processes of students and have you made provision for assessing these generic outcomes properly? Have you thought about and planned how these generic skills and qualities will be transferred to other contexts such as work and further study?

Thirdly, how are you doing in terms of using what is available from the latest educational research? Do you believe in having contact with your students beyond merely classroom experiences? Do you believe that students learn better by cooperating than by competing with one another? Do you believe in active rather than passive learning tasks? Do you give prompt and frequent feedback to students on their learning? Do you have high expectations from your students and do you communicate this to them? Do you respect and use student diversity to increase learning opportunities for students?

Lastly, do you believe in the concept of a learning community to render educational results? Do you focus on creating learning opportunities rather than adopting the role of disciplinarian? Do you remind yourself of the broader curriculum goals from time to time or do you only focus on your own course and its content? Do you prepare students for what they are about to learn, or do you only focus on the learning task at hand? Do you constantly emphasise the "big picture" and connections amongst information and data or do you expect students to learn material not integrated into bigger schemes? Do you assist your students to engage in discourse or do you only require answers to series of questions? Do you allow your students sufficient time to practise and try out what they have learnt? Do you believe in the concept of "scaffolding" your students' learning when needed? Do you use co-operative learning as an educational strategy? Do you allow students various opportunities to demonstrate their learning gain?

My aim is far from embarrassing you by posing all these questions. I have only summarised some of the implications of research on teaching in new learning environments. These are the implications of the new roles required by teachers when they want to productively support the learning of the modern-day student - indeed a challenging task - not only to you in Agriculture education, but to all educators in higher education.

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