

REFLECTIONS ON THE MODERN MASS UNIVERSITY AND THE QUESTION OF THE AUTONOMY OF THINKING

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1. Introduction

The article examines the concepts of massification and globalisation of higher education and contrasts them with some concepts from developmental psychology. The traditional task of universities is to train autonomous, self-directed and critical citizens who think scientifically. In this article I shall ask whether these tasks are possible in massified, marketised and globalised universities. My main aim is to draw on empirical findings to open theoretical perspectives on the topic.

Current discussion about adult cognitive development is taken into consideration here because instructing students in scientific thinking skills is among the foci of research in this field. Developmental psychology produces basic psychological knowledge about the specific periods of life that university students and university staff are going through. The modern conception of how thinking develops in adulthood, known as the post-Piagetian tradition, will be used as an instrument for considering how what are primarily sociological concepts (massification, globalisation) can be analysed by means of psychological theories.

2. Developmental Psychological Aspects of University Teaching: Autonomy and the Postformal Development of Thinking as Goals of Development in Adulthood

As a scientific discipline psychology focuses on examining human action and the ways in which it changes and develops over time. The word *psyche*, originating from the Greek language, refers to the mind, the soul, while the other root word forming the modern term psychology, *logos*, refers to knowledge or reason.

The psyche, or the mind, which is often used as its synonym, is always in a state of dynamic change. The lifespan development of an individual is seen as a continuous and qualitative process of change where different levels and stages follow each other. In itself, developmental psychology is the foundation of all psychological research because there is no mental phenomenon without historically earlier layers and roots going back to childhood.

From the perspective of developmental psychology, there are general questions of adult development, and secondly, in this book in particular, more *specific* developmental questions concerning *university students and staff, who are living their young, middle and later adulthood*. The usually mentioned general developmental demands affecting young adults involve the formation of an identity of one's own: one must become autonomous of one's parents and birth family, initiate intimacy and sexual relationships, separate oneself from home, educate oneself and, lastly, integrate oneself into a job one has selected and into working life in general. Most of undergraduates are living their young adulthood, which means that in psychological terms they are dealing with these questions throughout their years at university. As regards university staff, that is researchers and teachers, they are going through the early and later middle-age phase of their life. The major developmental task associated with this period of life is generativity: it has been found that in middle adulthood one has a tendency and need to establish one's own life project, hoping to leave younger generations something new produced from one's own resources (Erikson, 1980).

The issues discussed above are important from the viewpoint of the basic structure of adult life. Most importantly from the perspective of this book, the development of the *thinking* skills that emerge in adulthood foregrounds topics which are of interest in the context of mass higher education and globalisation. That is, universities pursue a number of universal goals: *teaching students scientific knowledge* based on the latest results of scientific research, training them to think scientifically, and, in addition, instructing them in the basic elements of *critical, autonomous and individual thinking*¹.

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The word autonomous is defined here according to the Penguin Dictionary of Psychology (Reber (ed.) 1995) as *controlled from within, internally controlled, self-regulatory*.

During the last three decades, the post-Piagetian tradition of cognitive psychology has emerged as an important field as regards describing thinking of this kind (Alexander, Druker & Langer 1990; Commons, Richards & Armon 1984; Sinnott 1994; Sinnott 1998; Miller 2000). As such, since the early 1980s the hypothesis of postformal cognitive development has been put forward by many scholars especially in the USA, but later the discussion has become an international one (for its latest stage see Kallio & Pirttilä-Backman, in press; Baltes & Staudinger 2000). The basic argument of these scholars is that in qualitative terms adult thinking develops in a direction where the scope for autonomous and individualised thought is increasing all the time². Today, this type of adult thought characterised by continuous development is called *postformal thinking*³. Postformal thinking in itself has as its core the idea of thought as an autonomous activity, even if every scholar seems to conceptualise the phenomenon in a different way. Research on adult cognitive abilities is widespread; it even has a name of its own: paralleling postformal thinking it has been termed relativistic dialectical thinking (Kramer 1983). In the following, both words will be used as key concepts describing the topic of this article, the question of training students in autonomous thinking during university studies. It is also interesting that lately the concept of wisdom has been linked with this phenomenon (Baltes & Staudinger 2000). According to these authors, the concept of postformal thinking is actually very close to, or included in, the concept of postformality. Among their latest empirical findings is the surprising one that the

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It is also possible to use self-directedness as a concept loosely analogous to autonomy. Self-directedness features as a concept in the field of education (see especially Piesanens article in this book). As such, the interrelationship between the twin concepts of autonomy and self-directedness might deserve further examination in the future.

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For the careful reader I must explain that postformal development is used here as a descriptive word, not as denoting a developmental stage in a normative sense. Normative development from one stage to another is easier to observe during ontogenetically earlier development than in adulthood. This may imply that a human beings autonomy in adulthood gives them more freedom to select, evaluate and to be self-directed - precisely as it is argued in the postformal tradition of thinking in developmental psychology.

major period of the acquisition of wisdom-related knowledge before early adulthood is the age range from about 15 to 25 years (ibid.). Thus, the first signs of independent thinking emerge during ones upper secondary school and university years.

According to a meta-analysis by Deirdre Kramer (1983), the following assumptions about knowledge are typical features of postformal, relativistic dialectical thinking:

- (i) realising the non-absolute nature of knowledge (relativism);
- (ii) accepting that there are contradictions in knowledge; and
- (iii) integrating contradiction into a totality (dialectical thinking).

These qualities have been demonstrated not only in the average population but, actually, in groups of undergraduates in various parts of the world, though these stages are named differently by each scholar, leading to what may be slightly different foci (Perry 1968; Commons et al. 1982; Demetriou & Efklides 1985; Kallio 1998).

Before self-directed and individualised thinking develops, young people reason in absolutistic terms. Assumptions about knowledge are absolute, core assumptions about the essence of reality static, that is, one believes that every problem has only one solution and that and basically there is nothing new under the sun (by contrast, mature subjects believe on continuous development and change). In relativistic dialectical thinking, the self, autonomy and the individualisation of thinking become all the time more and more important issues (e.g. Labouvie-Vief 1980). Edelstein and Noam (1982) argue that it is only during adulthood that the self begins to coordinate different modes of thinking, which means that one must engage in some kind of metareflection on different ways of thinking, world views and belief systems. In the field of scientific thinking ones reasoning is similarly supposed to become more independent. One selects independently, from a vast set of possible ways of explaining the given phenomenon, the principles which one will follow. *This is*

actually the core of all scientific studies and research. To university researchers and students, contradictory explanations, theories and models are everyday phenomena. Given autonomy of thought, the importance of metacognitive, self-aware thinking is also enhanced (e.g. Commons, Richards & Kuhn 1982; Demetriou in press). On a very elementary level, metacognition may be defined as 'reflection on one's own cognition'. The highest or most developed form of metacognitive awareness has been identified also with postformal thinking because an exhaustive awareness of one's own actions, thoughts and behaviour implies the activation of functions of the self.

We need a fuller description of relativism and dialectical thinking. For example, Kramer and Bacelar (1994) consider that in adulthood, the following features are incorporated into autonomous thinking processes: (i) interdependence of cognition and affect; (ii) awareness of the pervasive influence of culture and history in the construction of reality and knowledge systems; (iii) questioning assumptions about the so-called absolute truths of Western civilization; (iv) promoting experiential and intuitive knowledge; (v) recognising the interplay among multiple systems in constructing reality; and (vi) recognising our global interdependence.

3. Rethinking Autonomy vs. Globalisation and Massification. How Are They Related in Modern University Teaching?

I GLOBALIZATION. (i) Questions about globalisation and university teaching. From the perspective of psychology, it may be assumed that autonomous, relativistic and dialectical cognitive development can be viewed as a mechanism for adapting to the megatrend formed by the information society and globalisation (see also Kallio & Pirttilä-Backman in press). The complex

cognitive processes described above may serve as coping mechanisms that allow humans to adjust to an almost uncontrollable environment. In the midst of a rapidly changing society, the role of oneself as the critical subject of a process of selecting essential information is becoming more and more important all the time. At university, an ability to select and critically regulate, from a self-based perspective, scientific information is a nearly indispensable skill among both students and researchers and teachers as a defence mechanism against stress. Thus, a selective approach to and the self-directed filtering of incoming information function as a mechanism for balancing one's personality and emotional life. Without these protective mechanisms we would find it extremely difficult to maintain a healthy mental equilibrium.

Some interesting questions may, however, be asked here. Does globalisation automatically mean increased autonomy as it has been defined earlier - an independent understanding and integration of *different ways of thought*? Does it mean the survival of different thinking styles - national, local, cultural, and so on world views, values, scientific traditions - or does it mean economic pressure to limit oneself exclusively to Western culture as an absolutistic way of defining norms for thinking? Is globalisation a question of adopting some universal mode of academic training and scientific thinking or does it imply locally modified, individually creative ways to enrich scholarly culture?

But surely globalisation can also have side effects that are positive in terms of the development of postformal thinking. Its best consequences may make for closer discussion between many different cultures, thus improving opportunities to create new scientific innovations because impulses from a diverse range of academic cultures are one precondition for an exchange of ideas. In summary, a consideration of globalisation from these two viewpoints reveals that it may be a double-edged question.

(ii) *Globalisation and ways of reinforcing postformal thinking.* Välimaa argues in his introduction to this book that Finland has always lain and continues to lie on the borderline separating the cultures of Western and Eastern Europe. At the same time, Finland has, unlike many other countries in the world, had a very homogeneous culture. These are in themselves interesting sociological factors, and psychologically considered, the sociopsychological climate of the Finnish higher education system may reflect these facts. As such, a homogeneous higher education culture where there is no definite multicultural climate can produce absolutistic world views and excessively rigid traditions and schools of thought in the field of science and scholarship. However, all this is clearly changing in a situation where the intercultural exchange of students and researchers is strongly encouraged, as it is today. International student exchange maybe defined as one aspect of globalisation.

Considering the positive aspects, international student exchange may be an good example of globalisation as a factor that fosters postformal thought. This is a hypothesis which could be empirically tested, but more speculatively, becoming familiar with different cultural backgrounds and value systems may have a triggering effect on student thinking, and surely it will instil relativism and tolerance. In itself, it may teach students how differently academic cultures conceptualise the same things. The most creative act possible in this context may be the dialectical integration of the knowledge base forming ones own educational capital with the new innovative ideas of a multicultural academic environment. Cooperation between different world views, religions (Miller 2000) and traditions of thought is certainly emerging as an important activity in the future. International student exchange provides students with more opportunities to expand their mental horizons and, at the same time, to bring back new impulses to their own university. In this way, new innovations become possible as something old and something new come together in the

scientific community.

Nevertheless, as is true of all the questions discussed in this article, we are again dealing with a two-edged issue. On the one hand, theoretical pluralism is in itself a part of any university, wherever it is based. It may be argued that autonomous, postformal thinking will develop naturally in *any* university without any special globalisation- that is, every academic is certain to have their own favourites among scientific theories and models, and as they contrast these pluralistic visions of their teachers, students will surely learn comparative thinking and independence. Globalisation may, however, bring new elements into this pluralism by promoting multicultural diversity in the classroom (Kramer & Bacelar 1994). Nevertheless, this does not in itself guarantee the development of postformal thinking.

II MASSIFICATION. (i) Are we dealing with experiential stress or with massification?

The word massification was originally defined on the basis of student numbers: according to Välimaa (in this book), at the beginning of the 21st century Finnish higher education offers student places to over 70% of the relevant age cohort. Also, the yearly production of doctoral degrees has more than doubled. Välimaa argues further that this expansion of higher education is a clear signal of massification. Secondly, in Finland massification has been understood as an unfailing indicator of poor teaching methods and practices in universities. The puzzling factor is, however, that the ratio between students and teachers in Finnish universities is not high in itself as compared with many other countries where entrance to universities is free and where there can thus be real problems with massification.

The findings of Kallio's (2001) study of the assessment of university teaching in a local Finnish university⁴ suggest that it may be possible to use the phrase experiential massification to

⁴ The study, Self- and Peer Assessment Method, was conducted in 2000-2001. Four university departments carried out

describe this situation. It is obvious that university teachers do feel a great deal of stress because of the pressure of their work (lecture groups are too big, there are so many meetings in this department that I have no time left over for the students, there is too much of everything except for financial resources, study schedules are too tight). Possibly this phenomenon might be called experiential teaching-related stress. Massification could then be used as an explanatory variable for this subjectively experienced stress among teachers, but a closer consideration reveals that massification cannot be more than one among many stress factors, for example the pressure created by the need to ensure ones continued employment by ones university and other stressors, such as being unable to focus on research alongside ones teaching, too many administrative meetings and other such factors. In conclusion, it may be that massification has been used as the only explanation for university teachers stressful situation even though a closer inspection shows that there must surely be many other stress-inducing factors affecting them.

Kallio's study focussed on an evaluation of the teaching practices of paired university departments. The interviews with the people taking part in the project made it clear that assessing teaching was perceived as something that is of secondary importance in universities, though there were also exceptions to this rule. One focus of my study was to appraise how postformal reflection deepened as a result of a one-year evaluation process. As was argued in the beginning of this article, an exhaustive metacognitive awareness is one of the signals of postformal thinking. As such, comparative evaluation of teaching practices between two departments is an experiment intended to compel the staff of the departments to use their postformal thinking abilities. The organisational evaluations of paired departments were successful in some cases but less fruitful in others. Some departments found the method beneficial as a means of learning something new and of reflecting

a project to evaluate their own and another university departments teaching practices.

on their own teaching methods with a view to understanding what they were doing wrong, while other departments failed to get anything useful from the department they were paired with. Moreover, from the perspective of globalisation it was also interesting to note that only one department chose an evaluation partner from abroad, in this case a department at a Norwegian university. All the other departments found partners in their own university or in some other Finnish university.

There is an obvious risk that both university students and university teachers will become overstimulated in an environment which is saturated with scientific information. Cognitive selection and the ability to protect oneself from information overload are psychological abilities essential in today's world. Actually, these selection processes and the ability to focus ones attention are closely related to ones ability to think autonomously, select information and integrate the given information from one's own subjective viewpoint rather than from that of one's external environment.

The fact that a mass university, operating within a mass higher education system, trains professionals for the labour market (e.g. psychologists, economists), is in itself related to critical thinking. In the modern information society everybody needs skills which have to be developed at university - such as critical and independent thinking. To mention an elementary example, critical media literacy is a skill needed by every independent adult, as is the ability to read critically about scientific findings in journals and magazines, or surf the Internet. Thus, being trained in autonomous thinking will be essential in any case, wherever the students will find themselves a place in working life.

The pressure to organise university teaching in ways requiring students to attend crowded lectures reduces the scope for individualised tutoring and counselling. The question of how students are to be trained in autonomous thinking in mass higher education is crucial indeed. There is a

contradiction here: on the one hand, our psychological knowledge of adults tells us that they are autonomous, individualised subjects who are critically aware as they separate facts from non-facts; on the other hand, the teaching practices applied in massified universities may not accord with this developmental task faced by growing adults. If massification is identified with crowded lectures and surface learning practices, it can be questionable whether such developmental tasks are really being taken into consideration in modern universities.

4. FINAL REMARKS

(i) *Training people in autonomous thinking: A solution to the problems of massification?* Another question facing us concerns ways in which teaching could be improved in modern mass higher education systems. How can autonomous thinking be promoted through mass lectures? What kind of enrichment methods should university teachers use to achieve this aim? What kind of teaching methods are the best tools for fostering mature thinking? In a mass higher education system, it is absolutely impossible to pay attention to the individual characteristics and personality factors of every single student. In the scientific community, the autonomy of any information means that we are able to and must be constantly taught *to evaluate* scientific knowledge, *to contrast* scientific results, and, in an ideal situation, to draw from them our own, *independent conclusions*. This might be the ideal state of autonomous thinking. Such training means, at the same time, that extrinsically oriented students are taught to think intrinsically. The importance of students own inner activity is foregrounded (see also Honkimäki's article in this book).

There have been empirical tests of whether it is possible to train students in autonomous thought. For example, Kallio (1998) tested trainability for postformal thought in a group of first-

year university students, focussing on how well the students master the coordination of multiple thought systems. The first-year student's ability to autonomously integrate different thought systems was not high at the start of the training programme. Of the 101 first-year students, about 40 were found to be altogether incapable of reflection and the self-directed integration of different ways of thinking. Only 4 students achieved the highest rank of dialectical thinking; this finding has been previously confirmed also internationally (Commons et al. 1982; Demetriou & Efklides 1985). In Kallio's study, it proved possible to improve the standard of independent thinking among the subjects during a training programme even though the programme lasted only six weeks. In another study by Kallio (2000), four university teachers representing various disciplines were tested for their autonomous thinking abilities. Only one of the four teachers filled the criterion for this form of thinking. Despite being a case study of four teachers, the investigation may indicate that access to mature, autonomous thinking is not necessarily very common even among university staff. However, the finding must be confirmed by examining larger groups of subjects.

Another consideration is the adoption of new methods to reinforce self-directed learning previously used mostly in open university education (see Piesanen's article in this book). For example, distance education and providing access to university studies through the virtual university will surely become increasingly important in the future. Technology-based virtual learning methods will certainly also be one possible new innovative strategy available in a mass university system, also making it possible to reach large groups of students simultaneously. Globalised education in the form of virtual education is within reach, and the interconnectedness of different cultures is thus even closer at hand, which is one more factor promoting postformal thinking.

(ii) *The Humboldtian idea of university: Alternative university systems as a possible*

antithesis of modern mass higher education? The Finnish version of the Humboldtian university had tighter student selection criteria than today's university. This does not in itself guarantee more individualised teaching, tutoring or counselling practices. The administrative structure of universities - whether Humboldtian or that of a mass higher education system - as such cannot be an indicator of a superior quality of education or of a university's focus on training students in autonomous thinking. The important element are many other factors which may or may not affect the actual situation, such as teachers motivation to teach purposefully, their awareness of how scientific thinking and a critical attitude towards information can be taught, their ability to organise their schedule so as to allow time both for research and teaching without causing stress. Among other things, these factors ensure teachers a basic sense of confidence, which in itself will give a teacher more scope for modifying their instruction. Professional motivation and love of teaching are also absolutely necessary factors, and they are not problems of the university system but of the individual. The claim that either model of university is better as such is doubtful. From some perspectives it can be more stressful to teach in a mass university system, but the Humboldtian university can also have stress factors of its own. And in both university systems it is possible to train students in autonomous thinking: for example, there are instances of such training in Kallio's (2000) book about university teachers' projects to develop their teaching practices in modern mass university by instructing large student groups using new teaching methods. Thinking innovatively with the aim of creating teaching strategies of a new kind is not forbidden in a mass university.

In a mass higher education system, management by results and an emphasis on production in universities create pressures on students and staff to speed up the production of theses or scientific results. It may be asked whether it is possible to develop truly autonomous thinking over short periods of time without drastically changing teaching methods and practices towards

purposeful training in these skills. Is it easy to train people in autonomous, wise thinking? What kind of schedules should be arranged to make it possible? Being productive at university means intense competition for publication in international journals, which is time not available for investment in teaching and counselling students, developing teaching practices and for maintaining ones general motivation to take part in continuing professional training. Thus, there is a vicious circle here. How is it possible to combine, among university staff, demands to improve teaching with the pressure for high scientific productivity? It may also be argued that the need to be productive deprives teachers of their academic freedom and individual ways of thinking and acting in academy (see also Aittola's article in this book). This may be one consequence of the marketisation of university, making it possible to doubt whether basic tasks of universities are really being fulfilled.

Such a massified and marketised university may give further impetus to a search for alternative forms of university life. There are already other institutions outside the official university system which have as their educational philosophy a different view of university teaching - for example, universities based on anthroposophical world views (Waldorf colleges around the world focussing on teacher training, such as Snellman College in Helsinki, Finland. Similar colleges and universities exist also in, for example, Germany and the USA). These colleges student intake is small, and the basic aim of their teaching is to organise education on the basis of a world view drastically different from our own. Besides the colleges mentioned above, there are also other pedagogical alternatives grounded on different ways of understanding education, such as the respective pedagogies of Freire and Krishnamurti, not to mention still further alternatives. The point is that if the quality of the teaching delivered and the learning enabled in the massified university is perceived as poor, then the system itself may find itself facing outside competitors, and there can

arise a clear demand for universities that are better at teaching their students and helping them to learn, more individualised and higher-class. The emergence of private universities in Europe may be seen as an indication of teachers and students frustration with a mass higher education system.

Kincheloe, Steinberg and Villaverde (1999) underline emphatically that educational policy should be completely reconceptualised, including policies on university education, where typical viewpoints have represented white, Western European, male, middle- or upper-middle-class culture. For example, incorporating feminist pedagogical principles into university pedagogy may be an example of a link between emotion and affect, a feature which has been discussed also as a characteristic of postformal thinking in the earlier sections of this article. An experiment in introducing some principles of this kind of pedagogy into university education was recently conducted in Finland (see Lautamatti 2000) with the aim of encouraging democratic principles in the interaction between students and university teachers during teaching sessions. Arts have also been added to university pedagogy as a means of training students in scientific thinking (Nikula, 2000). These innovations may be signals that there is increasing dissatisfaction with the teaching practices of the modern mass higher education system.

Some of the ideas presented in this article are summed up in Figure 1. Briefly, I have tried to demonstrate that all the questions and concepts discussed in this book are surely two-edged phenomena in their essence. Autonomy is the basic developmental aim of adulthood; we become mature only after having been educated externally during childhood and youth. But autonomy as such is not enough. We interact constantly with other people, and we should coordinate our independent ways with the thought of others. Although autonomy has been the core of this article, it must be remembered that a human being is always cooperating with the external world and is always also extrinsically directed. This is again an area where we are in the midst of theses and

antitheses: we have to follow, for example, the laws and regulations of our society, but at the same time we must never lose our self-directness in making decisions. Autonomy as a concept has something in common with globalisation - we have to make our own intellectual contribution to different ways of thinking, nationalities, world views, scientific traditions and religions. If globalisation is understood as homogenous, absolutistic thinking based exclusively on the values of a single culture, it may be a much more problematic trend. Massification has similar two-edged characteristics. On the one hand, there is the fact that as measured by the numbers of incoming students, the Finnish university system has clearly expanded. On the other hand, the teacher-student ratio is not high. Simultaneously, however, perceived stress indicates that there are some problems which can have an effect on a teachers ability to cope with the demands of and the need to further improve high-quality teaching.

Lastly, I would argue that independence of thinking should become the focus of efforts to cope with the complexity of mutually contradictory viewpoints that are a natural feature of the modern world. These contradictory viewpoints may involve, for example, the integration of two scientific explanations of the same phenomenon. Fostering personal development and independence should be a part of the basic values of every educational system and a part of our (Western) way of thinking, and, possibly, a part of the present period of the history of our ideas about the nature of humanity. Individual counselling, promoting autonomous thinking capabilities and fostering independent, critical thinking are absolutely essential in a globalised media and Internet world. It is clear that innovative action, studying and research are possible only at university, where freedom to study and pursue research is possible, and where debate, disagreement and critical discussion are encouraged. These factors also foster democratic principles of education, which have been a cause of concern among some students of postformal thinking

(Kincheloe et al., *ibid.*).

FIGURE 1. Absolutism, relativism and dialectical thinking as three forms of adult thinking and factors that reinforce/contradict them in university teaching.

ADULT FORMS OF THINKING

ABSOLUTISM

- * world views and scientific truths as given
- * being stuck with a single way of thinking
- * inability to expand ones perspectives through alternative explanations

WAYS OF REINFORCING THEM IN UNIVERSITY EDUCATION AND CRITICAL COMMENTS

- * homogenous traditions of science as taught in university curriculum
 - * no debates between scientific ways of thinking
 - * may result in a single-truth system of thinking
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RELATIVISM

- * an awareness of multiple ways of explaining the same scientific phenomenon
- * no attempt to evaluate them independently; a laissez-faire attitude towards multiple systems

WAYS OF REINFORCING THEM IN UNIVERSITY EDUCATION AND CRITICAL COMMENTS

- * teaching multiple theories, models and hypothetical systems while describing a phenomenon
 - * debating between traditions encouraged, but independent thought not encouraged (i.e. students not encouraged to draw their own conclusions about the theories/models/assumptions taught)
 - * may result in a chaotic world view lacking any clear commitment to anything
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DIALECTICAL THINKING (AUTONOMY)

- * an awareness that there are multiple systems of thought, but the emphasis is laid on critical, independent reflection on these systems
- * recognition of the interdependence of things (e.g. global interdependence of nations and the economy)

WAYS OF REINFORCING THEM IN UNIVERSITY EDUCATION AND CRITICAL COMMENTS

- * critical thinking habits: not accepting anything at face value but assessing and weighing things
 - * integrative thinking habits: being able to integrate theories, models, world views; in psychology, for example, the integration of emotion, will, and cognition
 - * teaching multiple theories, models and hypothetical systems while describing a phenomenon
 - * free discussion, evaluation, debate, where students form personal opinions
 - * students are encouraged to draw independent conclusions from existing scientific results
 - * multiple world views are contrasted, cultural differences are understood by evaluating their similarities and differences
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