

## Critical Thinking: A Question of Aptitude and Attitude?

Ana M. Nieto and Carlos Saiz  
University of Salamanca, Spain

### Abstract

Traditionally, it has been held that critical thinking requires a set of cognitive skills and dispositions. The present work supports the opinion of some theorists who have proposed that these might not be the only two ingredients necessary for improving critical thinking. More specifically, new factors could be necessary if critical thinking is to be achieved, such as gaining an epistemological understanding of critical thinking; reaching a given level of epistemological development, or the beliefs that are held about thinking. These new components are analysed conceptually and instructionally. Special attention is also devoted to dispositions.

### Definition of Critical Thinking

Despite the many efforts made, there is no commonly accepted definition of critical thinking. Indeed, the number of definitions is almost as large as the number of researchers engaged in its study. In order to understand the nature of the issue, let us therefore look at some of those most widely accepted. McPeck (1981) defines critical thinking as “*the skill and propensity to engage in an activity with reflective skepticism*” (p. 7). This definition points to two important aspects of critical thinking; namely, dispositions and skills. Ennis (1987) defines it as “*reasonable, reflective thinking that is focused on deciding what to believe or do*” (p.10). This definition is more pragmatic and operative since it emphasizes both the behavioural aspects and the aims of critical thinking. For Lipman (2003), it is *thinking that facilitates the undertaking of good judgements within and by criteria; it is self-correcting and sensitive to context*. Thus, the definition of Lipman also refers to its aims—the making of good judgements, highlighting the means for doing so— together with its self-correcting nature.

The nature of critical thinking is so complex that it is not easy to synthesise all its aspects in a single definition, although as such they do allow one to refer to some of its most important characteristics: skills and dispositions, reasoned judgement, and self-correction. Perhaps, rather than a definition it would be clearer to explain what critical thinking is and what is being done when one is thinking critically. Thus, in agreement with Halpern (1998) critical thinking is *propositive, reasoned, and directed towards a target*. It is the type of thinking involved in problem-solving, the formulation of inferences, the calculation of probabilities, and decision-making. In thinking critically, the individual *not only assesses the result* of thought processes—such as whether a decision has been good or offers the solution to a problem—but is also involved in *assessing the process* of thinking: the actual reasoning that leads to the conclusion or the class of factors that have taken that individual to a decision. Accordingly, critical thinking involves assessment or judgement of both the result of thinking and the process itself, with a view to gaining useful and accurate feedback that will serve to improve it.

Often, the skills of critical thinking have been considered as the cognitive skills of highest order, different from

those of lower order or more simple skills. For Paul and Elder (2001), critical thinking is in itself a second-order way of thinking, as compared with that of first order. Higher-order skills (Halpern, 1998) are relatively complex: they require judgement, analysis and synthesis, and they are not applied in a mechanical or routine way. Higher-order skills are reflexive, sensitive to context, and self-monitored. For example, arithmetic calculation is not a higher-order skill because it involves routine application of well-established rules, little attention being paid to the context or to other variables that might affect the result. However, deciding which of two sources of information is more believable is a higher-order skill, since it requires a judgement task about the variables affecting credibility and these variables are multidimensional and change from one context to another. According to some authors (e.g. Arons, 1979; Kuhn, 1993), it is unlikely that such higher-order skills will be developed merely as a result of maturation, and they must therefore be learned through a certain amount of instruction or teaching. At the same time, it is also clear that students find these skills difficult to learn, even when direct instruction addressing the skills is offered to them. And most teachers would probably agree that the skills involved in critical thinking are notoriously difficult to teach and develop. Nevertheless, this difficulty is not synonymous with impossibility.

### Components: Skills and Dispositions

For us, critical thinking consists of deliberate application and assessment of a set of skills and dispositions with a view to reaching a reasoned judgement as a fundamental basis for our beliefs, decisions or, in general, behaviour. To accomplish this process, it is necessary for people to have a set of cognitive skills, such as the ability to analyse, interpret, assess, infer, etc. For many years, *skills* were the only objective in the teaching and assessment of critical thinking and were indeed believed sufficient for this type of thinking to be engaged in.

Nevertheless, it is currently thought that the mere acquisition of and expertise in these skills of critical

thinking do not guarantee the process of thinking critically. A person can know and master such skills but may be unable to apply them; it is also necessary to be *disposed* and motivated to exercise them when circumstances so dictate. This is the opinion of most theorists in the field (e.g., Ennis, 1987, 1996; Halonen, 1995; Halpern, 1998; McPeck, 1981): critical thinking requires a *set of skills* and *attitudes*. Thus conceived, critical thinking comprises skills, which are the cognitive component, and attitudes, which would be the affective component or aspect (Kennedy, Fisher & Ennis, 1991). Together, these two aspects, and the putting into action of both of them, will be translated into the behavioural component of critical thinking, which would allow the accomplishment of this type of thinking.

Here we are trying to underscore the notion that skills alone are not sufficient to enable a person to think critically; if that person does not have the disposition or motivation to carry them out, there will be no critical thinking. Likewise, having the disposition is not sufficient either; if a person is disposed or motivated to think critically but does not know how to, there will be no critical thinking. Critical thinking requires the activation and putting into motion of both aspects; that is, critical thinking (the act itself) about something requires both components (dispositions and skills).

The initial overemphasis on skills was counteracted by the emphasis that attitudes began to receive. Some authors considered the latter to be so important that they proposed the need to include them as part of the very meaning of critical thinking (Hatcher, 2000; McPeck, 1981; Siegel, 1988). In fact Perkins, Jay and Tishman (1993) proposed a theory whose central construct is that of attitude, defying other theories that emphasise the skill-disposition tandem as components of good thinking, in general, or critical thinking in particular. Currently, most theorists consider that both components are equally important.

Although the concrete set of dispositions and skills included within each model may vary, some of them are common to all. For example, common to skills are the identification of assumptions, both those of the person and those of others, both those affirmed and those implicit; clarity and focusing on the essential aspects of the issue in hand; understanding the underlying logic (including inductive and deductive inferences); judging sources as regards both their credibility and their reliability, etc.

In dispositions, there is greater variability; among the most common one could mention being just to others; delaying judgements; adopting a stance when justified; questioning oneself, and using the skills of critical thinking, etc.

### Relationship Between Skills and Dispositions

One avenue of exploration is what type of relationship exists between these two components (skills and dispositions). Most theorists have advanced a positive relationship between them; in other words, a person with good skills for critical thinking would also have the disposition to carry them forwards. Conversely, a person showing disposition towards critical thinking would also be able to exercise skills when required to do so. Some research, however, has cast doubt on such a relationship. For example, in a first study carried out by Giancarlo and Facione (1994) with a sample of 193 students from secondary school, a significant and positive correlation ( $r = .41$ ) was found between the scores in the Californian Critical Thinking Skills Test (CCTST<sup>1</sup>) (Facione et al., 1990) and those of the California Critical Thinking Disposition Inventory (CCTDI<sup>2</sup>) (Facione & Facione, 1992). The positive correlation between skills and dispositions assessed by these tests suggests that 16.8% of the variance in the skills of critical thinking can be attributed to the differences in dispositions, and *vice-versa*. In other words, of all the different variables or factors that can explain the performance on these two tests, 16.8% can be explained in terms of the elements measured in the other test.

In another study with a larger sample (Facione & Facione, 1997), 1557 students from Nursing Studies who completed the CCTST and the CCTDI at the beginning of the academic year obtained a correlation of  $r = .20$  between dispositions and skills. Again, although there was a significant positive correlation, this tells us that only 4% of the variance in critical thinking skills measured by the test are associated with or can be attributed to the variance in the critical thinking dispositions evaluated by the test, and *vice-versa*. The rest of the variance in skills—96%—is not associated with or cannot be understood in terms of their dispositions, and *vice-versa*. Of these subjects, 793 completed the same tests at the end of the academic year. Again, a low positive correlation was found ( $r = .16$ ), with 3% of associated variance between dispositions and skills, and hence 97% that could not be explained by reference to these variables. These data from before and after the intervention indicate more clearly that the variance in skills is not associated with the variance in dispositions and that the variance in dispositions is not explained by the variance in skills. One striking aspect mentioned by those authors, and with certain implications for teaching critical thinking, is that a stronger relationship was found between the scores of the students on dispositions measured with the CCTDI at the start of the academic year and their scores on skills measured with the CCTST at the end of the year. That is, the students with a strong initial disposition towards critical thinking showed greater increases in their skills

after the intervention than those who had a lower initial score in critical thinking dispositions.

The above authors attempt to go further, trying to discern whether there is a specific correspondence between skills and dispositions; i.e., if each skill (for example, analysis, inference, interpretation, etc) corresponds specifically to one of the dispositional factors (for example, impartiality, the search for truth, systematicity, etc). Using these tests—the CCTST and the CCTDI—the number of possible combinations between five skills (analysis, inference, assessment, deductive reasoning and inductive reasoning) measured by the former and seven scales of dispositions (curiosity, impartiality, analysis, systematicity, self-trust, curiosity and trust in the judgement made) assessed by the latter, is 35. In 33 of the 35 possible relationships explored, it was found that a higher score on skills was correlated with a higher score on critical thinking dispositions. However, in all cases the correlations were very weak and never higher than 0.19. With the exception of the correlations between self-trust and analysis and between self-trust and assessment, none was significant.

### **Skills and Dispositions: Are They Sufficient?**

According to what we have seen so far, would it be possible to state that a person who has good dispositions and skills for critical thinking is able to think critically? In principle, it would appear that this is indeed the case since these are the components necessary for this type of thinking to be engaged in. However, are they sufficient?

Bailin (1999) considers that the teaching of skills and the fostering of certain dispositions are not sufficient for people to know how to think critically. A person may be aware of certain concepts such as justification, conclusion, evidence, reasons, or argument but fail to understand their usefulness, their relations, or their aims. Students must also understand the need to create and evaluate knowledge, a need that is accomplished by offering and evaluating reasons. That author proposes the need to develop an *epistemological understanding* of the actual process of critical thinking. These concepts must be acquired but their relationships and, above all, their aims must be understood.

This idea is also addressed by Siegel (1988), for whom epistemological knowledge is conceived in terms of “*a theoretical grasp of the nature of reasons, warrant, and justification*” (p. 35). The difference is that for Siegel this knowledge only forms part of the *evaluation of reasons* component—that is, it is a sub-component—whereas for Bailin it is the central concept within which critical thinking is conceptualised. This is what lends sense to all activities carried out during the evaluation of reasons. The activities of critical thinking should not focus so much on

fostering skills as on developing the whole conceptual network underlying critical thinking, attempting to connect activities and skills with the purpose of creating and assessing knowledge. For Bailin, a critical thinker is one who understands the evolution and evaluation of knowledge and one who believes and acts on the basis of that understanding. She proposes that immersion in practice is crucial to acquiring the type of understanding we are speaking of. However, a practice that is to go beyond the acquisition of skills should focus on developing that understanding; that is, it should focus on understanding the nature of the practice and its goal.

To say this involves recognising that there is a series of *epistemological assumptions* in which the activities of critical thinking are encompassed: assumptions that are implicit in its practice, such as believing in reason, believing in the possibility of a rational justification, in terms of criteria and standards inherent to critical thinking; believing in the desire to act on the basis of rationally justified beliefs, and believing that any beliefs or criteria may be wrong or inappropriate. Likewise, the practice of critical thinking is incompatible with another type of epistemological assumption, such as believing that knowledge is true and comes from an authority; this does not leave room for a reasoned assessment of assertions and hence neither for critical thinking. Another position incompatible with this type of thinking is relativism, in its different manifestations. For example, naïve relativism considers that all opinions are subjective expressions of preferences, which are equally valid; another variant is the one that considers that a small part of knowledge comes from authority and the rest is a question of subjective opinion. Neither of these leaves room for critical thinking.

This connection between epistemological beliefs and critical thinking has been supported by some investigations carried out by Kuhn (1991) on argumentation skills. In this context, Kuhn discovered a relationship between what she calls *evaluative epistemology* (the one that negates the possibility of true knowledge but that understands that points of view can be compared with one another and assessed in terms of their merit or appropriateness) and the *development of argumentative skill*. The explanation offered by Kuhn for this correlation is that regardless of whether knowledge is considered to be entirely objective, true, or simply accumulative, as believed by *absolutists*, or whether it is thought to be completely subjective, as considered by the *multiplists*, argument will be superfluous. There is no place, nor need, for comparative evaluation of the alternative assertions that underpin argumentation. Only if knowledge is considered the product of a continuous process of examination, comparison, assessment and judgement of different, and sometimes opposing, perspectives will argument become the basis on which knowledge rests.

Going further, Kuhn (1999) has recently proposed a model of critical thinking in which the cognitive competences described to be fundamental to critical thinking are metacognitive—rather than cognitive—competences. Thus, she deals with metacognition in three broad categories: metastrategies, metacognition and epistemological knowledge. Whereas strategic knowledge has to do with the exercising of strategies, *metastrategies* are related to the knowledge, selection and monitoring of the most suitable strategies for achieving a goal. *Metacognition* operates on the basis of declarative knowledge itself: we know but how do we know that we know? Or, what do we know about our knowledge? *Epistemological knowledge* has to do with the broader understanding of the individual about knowledge and knowing. For Kuhn, this knowledge is of vital importance since, in part, *it will affect the other two components*. She has established a series of evolutionary stages in this class of knowledge, each of which has important repercussions in the development and use of the skills of critical thinking. These stages can be characterised as follows.

The first evolutionary stage—*realist epistemology*—considers statements that people make and the beliefs that such statements represent as isomorphic to external reality. If one accepts that in general critical thinking consists of or involves an evaluation of reasons, evidence, or statements, this stage leaves little room for such activity.

In the second stage, *absolutist epistemology*, statements are considered as beliefs. This way of considering them is an important advance since they may be in conflict with reality and, as a result, susceptible to being assessed. To carry out such an assessment, absolutists rely on the concept of *absolute truth*, which can be known, or potentially known, through direct apprehension or through the authority of an expert. Although this stage permits the development of certain rudimentary skills of critical thinking, however, for other more specialised skills it is not the ideal level.

The third stage, *multiplist epistemology*, dominates during adolescence. Beliefs or opinions are the property of their owners, chosen freely according to their own likings or wishes and, therefore cannot be subjected to critical assessment. Everybody has the right to their own opinions and all opinions are equally correct. This attitude leaves no room for judging the strength of an opinion, point of view, or argument, and hence neither is there room for the skills of critical thinking.

Many people remain in the multiplist stage throughout their lives, and only a minority progresses to the fourth and final stage—*evaluative epistemology*—in which all opinions are not equal and knowledge is understood as a process that links judgements, assessments and arguments. This type of epistemology has reconciled the idea that people have a right to hold their opinions, and the

understanding that some points of view, however, may be better than others.

Accordingly, for Kuhn of the three dimensions—metacognition, metastrategy and epistemological understanding—the most important for the development of critical thinking is a person's epistemological understanding. Kuhn also points out that this understanding is what determines and influences the other two dimensions, although she fails to explain how. One possibility could be that one will not analyse, not consider, or not reflect on “what it is that is known” or “how one has managed to know it” or “what strategy one has used” if one does not consider that knowledge and those strategies can be revised, judged and improved. And to arrive at the possibility of revising them and improving them, one must have a level of epistemological knowledge in which knowledge and how one acquires it are susceptible to assessment (evaluative epistemology). A person who does not consider that their own beliefs (metacognitive knowledge) and the way in which they have acquired them (metastrategic knowledge) and the beliefs of others can be analysed and assessed according to certain standards or criteria will never need to revise them and improve them. The development of critical thinking will be of little use.

Synthesising and integrating both positions, Bailin (1999) states that it is necessary to have an epistemological understanding of the actual process of critical thinking. That is, it is necessary to understand its nature and finality. This understanding can only be gained when students have reached the state of evaluative epistemology, as understood by Kuhn. Logically, one will not understand the nature and finality of this type of thinking unless one considers that affirmations, beliefs or facts can be evaluated, judged and improved.

Moreover, not only are the attitudes held with respect to the product of thought—that is, knowledge—important, but also those held with respect to the actual *processes of thinking about thinking*. Baron (1991, 1993) suggests that one of the most important determinants of how people think are what he calls *beliefs about thinking*, which are merely the beliefs people have about how they should think. For example, people who were prone to committing a single-sided bias tended to assess that way of thinking as better than thinking about both points of view, even when single-sided thinking favoured the opposite position to the one they held. Undoubtedly, this may be another important determinant for critical thinking and its skills.

### Conceptual, Empirical and Instructional Implications

Up to now, we have seen that it has traditionally been held that thinking critically requires two compo-

nents: skills and dispositions. Recently, however, doubt has been cast on the notion that these are the only factors involved. In particular, Bailin points out that it is necessary to achieve an epistemological understanding of this kind of thinking. Nevertheless, this understanding, in our view—and taking into account the epistemological states established by Kuhn (1999)—can only be attained when students have reached the state of evaluative epistemology. Thus, one of the most important determinants in the acquisition and development of critical thinking is the level of epistemological knowledge possessed by an individual. In the opinion of both Bailin and Kuhn, evaluative epistemology is the only type that offers space for critical thinking. Accordingly, it is very likely that only those who find themselves at this level will be able to develop and use the skills of critical thinking. This assumption should not offer any problems if most people were to achieve that epistemological level, although Kuhn (1999) states that very few people actually do so. In one of her studies (Kuhn, 1993), she found that only 15% of a sample of 150 people of different ages and education could be fitted into the category of those possessing evaluative epistemology. This is a bit disappointing if this variable is really so determinant for the development of critical thinking.

If the level of epistemological knowledge is really so important, we should consider it when carrying out our teaching of critical thinking. Often, important individual variables that could be really determinant for learning are not controlled and, very possibly, one of them could be the epistemological state of the students. Assuming the importance of this variable involves making important changes in how critical thinking is taught: before starting we should make an evaluation of the students with a view to determining which epistemological state they are in. Once this aspect is known, we would have to initiate the necessary resources so that those who are not in a situation of evaluative epistemology can acquire it, *if that is in fact possible*. On speaking of *possibility*, we mean that much more empirical work is required to be able to determine issues as important as the following: Is the epistemological state really important for the acquisition of critical thinking? Is there some instructional procedure so that students can progress epistemologically? In the event of obtaining affirmative answers to these questions, it would be necessary to introduce this new component in the instruction, basing ourselves on the description of epistemological states offered by Kuhn (1999). We believe that it would indeed be possible to mature epistemologically after correct instruction. According to Kuhn, multiplist epistemology is what predominates during adolescence. What leads young people to progress from absolutist epistemology to multiplist epistemology is the realisation that experts on a topic are often in disagreement about one another's views.

In light of such disagreements, multiplists opt for rejecting the idea of certainty, considering that all opinions or arguments have the same status and merit the same treatment. However, we know that this cannot be true because some arguments are better than others. Accordingly, if we teach students to evaluate the arguments offered by the experts, applying the validity criteria of each type of argument (e.g. Govier, 2001; Halpern, 2003; Saiz, 2002) we should be able to lead them to progress to evaluative epistemology. Naturally, this hypothesis should be subjected to empirical verification.

However, without going so far, we shall focus on the dispositions of critical thinking. *Grosso modo*, dispositions (Facione, Facione & Giancarlo, 2000) are considered to reflect the behavioural tendencies or inclinations of the individual to act in a given way. More specifically, they can be understood as a consistent internal motivation to act or respond to another person, event or circumstance in a given way. Thus, regarding dispositions towards critical thinking, one can consider them to be a *consistent internal motivation* to become engaged in problems and decisions using critical thinking. For some (Ennis, 1996; Facione et al., 2000; Paul & Elder, 2001), they are even considered intellectual virtues. Glaser (1941) described dispositions as part of a life style: "Persons who have acquired a disposition to want evidence for beliefs, and who have acquired an attitude for reasonableness have also acquired something of a way of life which makes for more considerate and humane relationships among (others)" (p.6). This way of conceiving the dispositions of critical thinking is important because it shows that although thinking is a purely internal and individual act it should not be forgotten that its results affect our behaviour, which in the immense majority of cases occurs within a social context. Accordingly, critical thinking also has a social component. This component is present both before and after a person has engaged in critical thinking, while critical thinking tends to take place within situations of social interaction (Johnson, 2000), although the results of such thinking has implications for such interactions, as pointed out by Glaser.

The huge importance accorded dispositions—considered as intellectual virtues, as part of a life-style and as being to a large extent responsible for the social consequences of critical thinking—contrasts with the little attention that has been paid to them during instruction. Most programs devoted to improving critical thinking underscore the necessity of both components: skills and dispositions.

However, with the exception of Paul and Elder (2001) most of them, although underscoring the importance of dispositions, focus only on instruction in skills. Evidently, from this instruction it is expected that one will be able to observe an improvement in such skills but

also, as mentioned above, since most theorists consider—implicitly or explicitly—that there is a positive relationship between skills and dispositions, it would equally be expected that after the intervention in skills, there would be an acquisition of and improvement in dispositions. However, according to some empirical studies (Facione & Facione, 1997; Giancarlo & Facione, 1994), this relationship is very weak, such that an intervention only in the skills of critical thinking would neglect the other component; i.e., dispositions. Another way of interpreting this hypothetical positive relationship would be that only those people who already have certain dispositions towards critical thinking would benefit more from an intervention in skills, and would therefore be those who would get the highest scores. In fact, the work of Facione and Facione (1997) demonstrated this. Nevertheless, this interpretation of the correlation does not tell us that dispositions have been the object of special attention either. All the foregoing suggests that instruction in critical thinking is only being implemented partially since dispositions are not only poorly taken into account but, also, sometimes not even considered.

Moreover, one striking aspect in this view is that dispositions are only emphasised as being a factor or variable necessary *to think* critically; that is, as regards their importance for exercising the skills of critical thinking. However, in our opinion there must be another set of *prior dispositions*, which would be necessary for the individual *to acquire* the whole set of skills involved in critical thinking, and become engaged in the intellectual challenge of thinking critically, such as being motivated to become involved in intellectually challenging tasks; the desire to improve oneself; the desire to trust in reason to justify one's beliefs and conduct, so on. Motivation is followed by learning; the more motivated one is the more one will wish to learn and the better able one will be to do so, such that those prior dispositions can be considered a necessary precondition (Zoller, Ben-Chaim, Ron, Pentimalli & Borsese, 2000) for acquiring those skills. The importance of these previous dispositions is reinforced by the results of the work of Facione and Facione (1997), in which a stronger relation was obtained between dispositions, measured with the CCTDI, at the start of the academic year and skills, measured with the CCTST, at the end of it. That is, students with greater initial dispositions in critical thinking showed better improvements in the skills after the instruction had been completed than those who obtained lower initial scores for dispositions. Therefore, if we do “anything” to strengthen dispositions before starting instruction in critical thinking we shall manage to get students to gain better improvements in skills. Thus, without them (prior dispositions) the development of skills will not be very fruitful. Let us therefore consider that dispositions are

necessary at two moments: *before the acquisition* of those skills, and *after* they have been acquired so that they can be exercised when necessary. Accordingly, if one takes into account that dispositions possibly not only participate in the processes of thinking critically but also in its acquisition, and that in some way these prior dispositions may be considered a necessary precondition, we consider that the disregard is double; in other words, that dispositions should be addressed at two moments: before starting instruction and during it. But how can we strengthen dispositions? We now offer a series of suggestions about this, although naturally not in the belief that they are the only way of improving them.

As pointed out by Bailin (1999), in order to foster dispositions beforehand, we consider it useful that students should receive information about the type of epistemological assumptions underlying the practice of critical thinking, such as the importance of being able to create, construct and evaluate knowledge in a rational way, being able to effect and justify behaviour on the basis of reason, and the importance of belief in the power of reason and in the other epistemological beliefs that we have previously stated to underlie the process of critical thinking. At the same time, the aim of such thinking should be stressed. It may also be useful to contrast the benefits of this way of thinking as compared with a thinking guided by intuition, authority or propaganda. Likewise, it would be appropriate to prepare students, in some way, for tasks that are intellectually costly and challenging, commenting to them that this type of thinking requires effort and that its learning involves certain difficulty but that such effort will be rewarded because it will lead to significant personal, professional and social benefits. The idea is that they should be able to appreciate the benefits of this way dealing with knowledge, problems and decisions. Once they have realised that it is beneficial, they should be more motivated to learn the set of skills involved in critical thinking. For the same reason, it may be of interest and even appropriate to teach the type of beliefs students have about thinking, explaining to them the type of thought process we are trying to instruct and why. To accomplish this, Baron (1993) suggests that it is necessary to present people with convincing arguments about why certain types of thinking are better than others if mistakes are to be avoided and goals are to be achieved. Such arguments should be assessed with respect to the theory of thinking that underlies instruction. Students should be assessed with respect to this understanding independently of whether they accept the theory or not. It is clear that one can attempt to convince but one cannot oblige or punish anybody for not doing what we feel is most appropriate.

To stimulate dispositions during development and instruction in critical thinking, Facione, Facione and

Giancarlo (2000) suggest that the best way is for the instructor to use modelling, use the problems and decision of critical thinking in varied contexts and different contents, reinforce good critical thought, challenge poor critical thinking and create a climate of reasoned enquiry. Another possibility is that once individuals have been immersed in the practice and begin to understand and observe the benefits of this way of coping with life and its problems it is possible to develop that class of intrinsic motivation that will allow them to use this way of thinking as a habit. Although there may be personal differences as regards having or not having a certain disposition towards critical thinking, one can also think of it in terms of a dynamic and continuous process in which students can become involved when they eventually perceive and understand the benefits of this way of thinking. This type of motivation towards critical thinking will emerge progressively as the students gradually become aware of its benefits. What will be costly, however, will be initiating them and involving them in this dynamics, such that the prior dispositions required for its acquisition may be harder to work and achieve than its actual practice.

Perhaps one could set up an analogy with sport. To begin to do sport (critical thinking), many people will have an intrinsic motivation (the disposition) required to do so and they will not need anybody to convince them of its benefits (it fosters their prior disposition). However, if we want someone who has never practised a sport to begin, we must first speak to them (develop their prior dispositions) and convince them that, although it is hard work and demands certain sacrifices, sport has uncountable benefits for physical and mental health. Then, we must get them to begin to do a little exercise (critical thinking), at least for a couple of days each week. Only when they practice (critical thinking) and can themselves observe the benefits derived will they want to keep on doing it and increase their activities in the field. It is then when we can say that they have intrinsic motivation (disposition) to do sport (critical thinking).

In synthesis, we can say that dispositions are as important as skills because in some way they are the motor driving the acquisition and use of critical thinking. Thus, if we wish to foster or improve critical thinking both must be treated and taught during the same instruction process.

To end, we wish to emphasise that along this work we have discussed prior well-established concepts (epistemology, attitudes, dispositions...), relating them in a new way with a view to pinpointing which of them may be determinant factors of critical thinking. In this sense, this paper offers a new conceptual perspective aimed at improving critical thinking that should allow us to advance in the field as long as such ideas can be contrasted empirically.

## Conclusions

Skills and dispositions may not be the only factors necessary for the development of critical thinking. To have an epistemological understanding of critical thinking, which is possibly acquired when evaluative epistemology has been gained, may well be a new factor to be taken into account when teaching.

During the teaching of thinking, it is necessary to place greater emphasis on dispositions because these are responsible for the efficiency of such teaching and, especially, for the use of the skills taught; that is, for the greater or lesser extent to which those thinking skills are used.

It is possible that dispositions are not only necessary for executing such thinking but also for its learning. An important set of prior dispositions should be considered before starting instruction. Fostering these previously may lead to a better learning of skills and hence of critical thinking.

Finally, it should be noted that much further empirical work is necessary if we are to determine which factors are necessary for critical thinking (e.g., skills, dispositions, epistemological state); which ones are susceptible to improvement, and to what extent and through which instructional procedures. Indeed, all the foregoing are necessary so that the nature of thought, its relationships, and the best way to teach critical thinking can be known in greater depth.

## References

- Arons, A. B. (1979). Some thoughts on reasoning capabilities implicitly expected of college students. In J. Lochhead & J. Clements (Eds.), *Cognitive process instruction: Research on teaching thinking skills* (pp. 209-215). Philadelphia: Franklin Institute Press.
- Bailin, S. (1999). The problem with Percy: Understanding and critical thinking. *Informal Logic*, 19(2&3), 161-170.
- Baron, J. (1991). Beliefs about thinking. In J. F. Voss, D. N. Perkins, & J. W. Segal (Eds.), *Informal reasoning and education* (pp. 169-186). Hillsdale, NJ: Erlbaum.
- Baron, J. (1993). Why teach thinking? - An essay. *Applied psychology: An international review*, 42(3), 191-237.
- Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. B. Baron, & R. J. Sternberg (Eds.), *Teaching thinking skills* (pp. 9-26). New York: Freeman and Company.
- Ennis, R. H. (1996). *Critical thinking*. Upper Saddle River, NJ: Prentice-Hall.
- Facione, N., & Facione, P. (1997). *Critical thinking assessment in nursing education programs: An aggregate data analysis*. Millbrae, CA: The California Academic Press.
- Facione, P., et. al. (1990). *The California Critical Thinking Skills Test (CCTST): Forms A and B; and the CCTST Test manual*. Millbrae, CA: The California Academic Press.
- Facione, P., & Facione, N. (1992). *The California Critical Thinking Dispositions Inventory (CCTDI); and the CCTDI Test manual*. Millbrae, CA: The California Academic Press.

- Facione, P. A., Facione, N. C., & Giancarlo, C. A. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking. *Informal Logic, 20*(1), 61-84.
- Giancarlo, C., & Facione, N. (1994). *A study of the critical thinking disposition and skill of Spanish and English speaking students at Camelback high school*. Millbrae, CA: The California Academic Press.
- Glaser, E. M. (1941). *An experiment in the development of critical thinking*. New York: Teachers College, Columbia University.
- Govier, T. (2001). *A practical study of argument* (5th ed.). Belmont, CA: Wadsworth.
- Halonen, J. S. (1995). Demystifying critical thinking. *Teaching of Psychology, 22*(1), 75-81.
- Halpern, D. F. (1998). Teaching critical thinking for transfer across domains. *American Psychologist, 53*(4), 449-455.
- Halpern, D. F. (2003). *Thought and knowledge. An introduction to critical thinking* (4<sup>th</sup> ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Hatcher, D. L. (2000). Arguments for another definition of critical thinking. *Inquiry: Critical Thinking Across the Disciplines, 20*(1), 3-8.
- Johnson, R. (2000). *On the very idea of critical thinking*. Faculty workshop presentation: Baker University.
- Kennedy, M., Fisher, M. B., & Ennis, R. H. (1991). Critical thinking: Literature, review and needed research. In L. Idol, & B. F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform* (pp. 11-40). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Kuhn, D. (1991). *The skills of argument*. Cambridge, England: Cambridge University Press.
- Kuhn, D. (1993). Connecting scientific and informal reasoning. *Merrill-Palmer Quarterly, 39*(1), 74-103.
- Kuhn, D. (1999). A developmental model of critical thinking. *Educational Researcher, 28*(2), 16-25.
- Lipman, M. (2003). *Thinking in education* (2<sup>nd</sup> ed.). Cambridge, MA: Cambridge University Press.
- McPeck, J. E. (1981). *Critical thinking and education*. Oxford: Martin Robinson.
- Paul, R., & Elder, L. (2001). *Critical thinking: Tools for taking charge of your learning and your life*. Upper Saddle River, NJ: Prentice Hall.
- Perkins, D. N., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking. *Merrill-Palmer Quarterly, 39*(1), 1-21.
- Saiz, C. (2002). (Coord). *Pensamiento crítico: Conceptos básicos y actividades prácticas (Critical thinking: basic concepts and practical activities)*. Madrid: Pirámide.
- Siegel, H. (1988). *Educating reason: Rationality, critical thinking and education*. New York: Routledge.
- Zoller, U., Ben-Chaim, D., Ron, S., Pentimalli, R., & Borsese, A. (2000). The disposition toward critical thinking of high school and university science students: An inter-intra Israeli-Italian study. *International Journal of Science Education, 22*(6), 571-582.

### Notes

<sup>1</sup> CCTST= California Critical Thinking Skills Test

<sup>2</sup> CCTDI = California Critical Thinking Disposition Inventory

### Authors' Note

Address correspondence to Carlos Saiz, Department of Psychology, University of Salamanca, 37071 Salamanca, Spain. E-mail: [csaiz@usal.es](mailto:csaiz@usal.es).

Ana Nieto may also be contacted at: [acarracedo@usal.es](mailto:acarracedo@usal.es).