Knowledge construction: the role of the teacher's interpersonal attitudes

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The role of the teacher's interpersonal attitudes

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Socio-constructivist perspectives on adult education, as well as many practitioners in the field, assume that the teacher's interpersonal attitudes influence the process of knowledge construction on the part of the participants. The aim of this paper is to contribute to an empirical evaluation of this view, and in particular: (*i*) to understand whether the actions enacted by an educator toward learners may be taken as local cues of her underlying general interpersonal attitudes in and about the situation; (*ii*) to try to describe such behaviours and to gather them into meaningful clusters; (*iii*) to explore possible differences in the general interpersonal attitudes of novice vs. expert educators; (*iv*) to correlate such attitudes with the learners' behaviours. Fifteen training courses for adults, each involving different educators, participants and topics, were observed. All the courses took place in classrooms in the city of Torino, Italy. Each course was simultaneously observed by three independent judges. Factor analysis led to the identification of four main interpersonal attitudes of the educators, namely *favouring cooperation*, *directivity*, *flexibility*, and *focusing on the group*. These attitudes were then correlated to indexes of the participants' levels of attention, participation and understanding. The results corroborate the hypothesis that the interpersonal attitudes of the educators correlate with the mental attitudes of the learners. In particular, a cooperative orientation appears to foster the conditions for the construction of new knowledge. The two subgroups of expert and novice educators achieved different levels of effectiveness. Overall, our findings support the idea that learning is a process of knowledge transformation that takes place within an interpersonal context.

Keywords: knowledge construction; adult learning; interpersonal attitudes; ecological classroom observations; teacher expertise; learner's proactivity.

Knowledge and learning in a constructivist framework

The research we describe aimed at studying how the interpersonal attitudes of teachers may influence learning in adult classrooms.

We adopted a constructivist perspective, according to which knowledge is subjective, embodied, and meaning-laden (Sierhuis and Clancey 1997; Tirassa, Carassa, and Geminiani 2000; Tirassa and Vallana 2010; Watzlawick 1984). As humans are intrinsically social and cultural, the knowledge they entertain is relational and intersubjective (Clancey 1997; Mate and Tirassa 2010; Tirassa, Bosco and Colle 2006).

Learning is the transformational process whereby an individual, to a variable degree of deliberation, constructs new knowledge. It builds on the subjectively driven interaction between the knowledge which he has already available and the mental and material experience which he is currently going through and narrating to himself (Carassa, Morganti, and Tirassa 2004, 2005).[1] Learning is intrinsic to the functioning of the mind, of which it is a continuing side effect.

While learning in general just happens, classes and other instructional environments are purposely designed to favour it. Learning contexts are complex systems of activities (Barab and Plucker 2002; Barab et al. 1999; Turvey and Shaw 1995) within which individuals may relate with each other and with the world by way of tools, whether conceptual or physical (Engerström 1987), as well as of the meanings and the narratives that they share (Mate et al. 2010). After the works of Dewey (1916), Luria (1976, 1979), Vygotsky (1978) and Vygotsky and Luria ([1930]

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[1] When speaking in general, we will conventionally use the feminine for the teacher(s) and the masculine for the learner(s).

1993), the sharing of knowledge between peers, their participation in real activities with experts, and the relations in which all are engaged are widely acknowledged as crucial features of formal and informal education (Andersen, Boud, and Cohen 1995; Cole 1996; Cranton 2006; Cranton and Carusetta 2004; Fenwick 2001; Keyser 2000; Kolb 1984; Lave and Wenger 1991; Marquardt and Waddill 2004; Revans 1982).

The relation between teachers and students is asymmetrical and structurally complementary (Lindsey and Barratt 2006; Wubbels, Brekelmans, and Hermans 1987; Wubbels et al. 2006). Because of her role as a catalyst of learning (Brookfield 1997), the teacher has to govern the conditions that will open the way for the learners' construction of knowledge and for the resulting changes in their ways of thinking and acting.

We investigated some aspects of the relation between the educator and her audience, and how these may affect learning. We described the educator's interpersonal attitudes and the learners' mental attitudes that prelude to knowledge construction as two collections of empirically observable indexes. Specifically, we listed a set of interpersonal moves that teachers may enact in the classroom, concerning, for example, how they use examples, reply to interventions or manage the overall agenda, and a set of motivational indexes in the learners, like their apparent levels of attention or understanding. Then, we analysed the statistical correlations between the two sets of indexes.

To study the actual practices that teachers enact in the classroom we made online behavioural observations during lessons. While there is a general tendency of researchers to move from experimental conditions to real classes (e.g. Bolhuis and Voeten 2001; Newmann, Marks, and Gamoran 1996), it is usually schools that are observed, and we found no literature concerning adult training.

Adult courses share many typical features of classroom environments. Complex networks of events occur within them that influence learning by way of a variety of cognitive, interpersonal, emotional, and cultural factors (den Brok 2001; Shuell 1996). Classroom contexts (Doyle 1986), in general, are characterised by the simultaneity of many events, the unpredictability of their evolution, the publicness of each actor's behaviours, the scarce time generally available for reflection, and the progressing accumulation of a commonality of experiences, norms and routines. The latter feature is usually lacking in adult training, where participants often have scarce or no previous acquaintance and little time to grow one. Consequently, the interpersonal dynamics in the classroom will depend more heavily, on the one hand, on more or less standardised routines and, on the other hand, on a deft management of the breakdowns that may occur.

The hypothesis that a teacher's behaviour should basically be consistent with her beliefs and ideals (Johnson 1992; Richardson 1994; Richardson et al. 1991) is scarcely supported by empirical evidence (Bolhuis and Voeten 2001; Fang 1996). This is probably due to the difficulties that teachers encounter in putting their abstract knowledge into practice in real contexts (Wubbels, Brekelmans, and Hooymayers 1992). Novice educators may find this particularly taxing (den Brok 2001; Hogan, Rabinowitz, and Craven 2003): consequently, we paid specific attention to possible differences between expert and novice teachers.

To resume, the aims of this research were

(1)   to explore whether the actions enacted by an educator toward the learners may be taken as local cues of her underlying general interpersonal attitudes in and about the situation;
(2)   to describe such behaviours and gather them into meaningful clusters;
(3)   to explore possible differences in the general interpersonal attitudes of novice vs. expert educators; and
(4)   to explore how such attitudes correlate with the learners' behaviours.

Studying relations in the classroom

The research design comprised four steps.

Label	Description	Frequency (Likert)					
Long example	Uses example long enough to be clearly understood	0	1	2	3	4	5
Universal example	Uses universal (abstract, historical, etc.) example	0	1	2	3	4	5
Personal example	Uses personal example	0	1	2	3	4	5
Participant's example	Uses example coming from participant	0	1	2	3	4	5
Group's example	Uses group's experience as example	0	1	2	3	4	5
Reformulates remark	Reformulates remark from the audience	0	1	2	3	4	5
Reformulates question	Reformulates question from the audience	0	1	2	3	4	5
Returns question	Redirects to audience question posed by participant	0	1	2	3	4	5
Leaves time	Leaves participants free time to reflect and intervene	0	1	2	3	4	5
Rewords concept	Rewords concept	0	1	2	3	4	5
Enjoyable climate	Smiles, jokes mildly etc.	0	1	2	3	4	5
Scaffolding	Helps participants to take part in group discussions	0	1	2	3	4	5
Uses first names	Talks to participants using their first name	0	1	2	3	4	5
Looks at every one	Maintains eye contact with participants	0	1	2	3	4	5
Keeps focus	Keeps focus on main topic	0	1	2	3	4	5
Paralinguistic fluency	Gestures fluently and flexibly	0	1	2	3	4	5
Prosody	Maintains varied, fluent prosody	0	1	2	3	4	5
Moves in classroom	Moves around in the classroom	0	1	2	3	4	5
Answers immediately	Answers immediately to participants' question	0	1	2	3	4	5
Closed question	Uses yes/no question or closed question	0	1	2	3	4	5
Open question	Uses open question	0	1	2	3	4	5
Talks a lot	Talks incessantly	0	1	2	3	4	5
Reduces time	Does not allow free time for discussion	0	1	2	3	4	5
Uses jargon	Uses a technical language unclear to participants	0	1	2	3	4	5
Interrupts intervention	Interrupts participant intervening on topic	0	1	2	3	4	5
Interrupts digression	Interrupts participant intervening out of topic	0	1	2	3	4	5
Gives own opinion	Expresses personal opinion	0	1	2	3	4	5
Judges	Expresses judgment about participant's opinion	0	1	2	3	4	5
Makes decision	Makes decision about activities and proceedings	0	1	2	3	4	5
Gives orders	Gives order to participants about group activity	0	1	2	3	4	5
Rambling	Rambles out of topic	0	1	2	3	4	5

Table 1. The 31 main relational actions performed by educators. Frequencies on the Likert scale range from 0 (never) to 5 (continuingly).

(1) To study the attitudes of the teachers and of the learners, we identified empirical indexes, that is, observable types of behaviours that the respective counterpart in the classroom (or the researcher) may use as cues of the underlying attitudes.

(2) Then we observed and scored the occurrence of such behaviours in real classrooms.

(3) We used factor analysis to understand how a teacher's underlying interpersonal attitudes may result from a composition of the minimal behaviours that she enacts.

(4) We used analysis of variance (ANOVA) test to study how the educators' attitudes may influence the learners' indexes; here we also explored differences between expert and novice teachers.

The behaviours of the educators

To study empirically the interpersonal attitudes of the educators' and how they may affect learning in the audience, it was first necessary to identify suitable observable indexes thereof.

Among the several observational and assessment methods available (Angelo and Cross 1993; Black and Wiliam 1998; Cotton, Stokes, and Cotton 2010; Slimani 1992; Wragg 1994), the best known is the Flanders Interaction Analysis Categories (FIAC) (1970). Focused on teacher–student interaction, it requires the coding of the events every few seconds according to a predefined repertoire (e.g. teacher lectures, asks questions, gives directions, accepts ideas, praises, etc.; student initiates, responds to teacher, etc.; silence). However, the FIAC method has seldom been employed in contexts other than schools.

The next step was to collect the views of expert practitioners within the field of adult education. We undertook semi-structured interviews with individual teachers, aimed at discovering how they manage interactions in the classroom with reference to the goal of fostering learning. For example, we asked the interviewees how they tend to react when a participant poses a question, makes an intervention which is not relevant to the topic, etc. Then we listed an array, as wide as sensible, of possible relevant behaviours that educators may enact during classroom interactions. A tentative beta version of the coding sheet was tested in several focus groups of adult educators (Nassar-McMillan and Dianne-Borders 2002). This led to further integrations and modifications.

The final version consisted of a list of 31 behaviours that appear to be commonly enacted by educators during lesson. These items were listed on a coding sheet where the frequency of each could be scored on a Likert scale ranging from 0 (the behaviour has never occurred) to 5 (the behaviour has continuingly occurred). The list is reported in Table 1. Most items should be self-explanatory; a few examples are:

- *Reformulates question*: the educator does not answer a question from the audience, but reformulates it so that (at least some of) the participants become able to find an answer by themselves.

- *Returns question*: the educator redirects a question posed by a participant to the audience, in the attempt to elicit an answer from the group.
- *Interrupts intervention*: the educator interrupts a discussion, relevant to the topic, that has been started by one of the participants or has arisen between them.
- *Makes decision*: the educator makes a decision concerning the classroom's activities and proceedings independently from the desires and opinions emerging from the group.

The manifest attitudes of the learners

Learners need to entertain appropriate mental attitudes that favour the construction of knowledge. A large body of literature has tried to identify them with the aim of understanding, and therefore becoming able to recreate, the conditions that facilitate learning in the classroom. However, objective evaluations of learning are difficult, in particular when soft skills like leadership or conflict mediation are concerned. Consequently, the actual outcomes of training

Label	Description	Frequency (Likert)					
Attention	Attend each lesson from beginning to end	0	1	2	3	4	5
	Keep gaze on the teacher (or other speaker) or on the slides	0	1	2	3	4	5
	Mind their own business (e.g. cell phone) during lesson or group work	0	1	2	3	4	5
	Manifest nonverbal behaviours showing indifference (e.g. yawning)	0	1	2	3	4	5
	Spontaneously correct teacher's errors	0	1	2	3	4	5
Participation	Pose questions/intervene	0	1	2	3	4	5
	Volunteer for exercises etc. (e.g. role play)	0	1	2	3	4	5
	Manifest interest in how the group proceeds toward the desired results	0	1	2	3	4	5
	Provide new and original ideas beyond what the teacher says	0	1	2	3	4	5
	Are available to speak about themselves in examples or during exercises	0	1	2	3	4	5
Understanding	Reformulate properly what has been said by the teacher or other participants	0	1	2	3	4	5
	Pose questions/intervene in ways that are relevant to the contents of the lesson	0	1	2	3	4	5
	Produce papers/documents/artefacts etc. that are relevant and in line with the contents of the lesson	0	1	2	3	4	5
	(After the first encounter) Do not need elaborate recapitulations of the previous lesson(s)	0	1	2	3	4	5
	(After the first encounter) Make proper references to the contents of previous lessons	0	1	2	3	4	5

Table 2. The indicators of the participants' attitudes. Frequencies on the Likert scale range from 0 (never) to 5 (continuingly).

are seldom assessed in adults, apart from testing practice when possible (Driel, Beijaard, and Verloop 2001), and we were unable to find reliable instruments in the literature.

Wanting to investigate adult education in ecological settings, rather than in the laboratory, we focused on mental states that (1) may be considered preconditions of actual knowledge construction and (2) may have an observable behavioural counterpart. Analytically, those that immediately come to mind are at least:

Attention. To understand the contents of a lesson one needs to keep one's attention on the topics that are discussed or the actions that are or have to be performed. The attentional level is therefore a manifestation and an indicator of the general attitude of a learner or group of learners.

Participation. The idea that knowledge and experience are systematically mingled is widely diffused (e.g. Boud and Walker 1990; Brown, Collins, and Duguid 1989; Clancey 1997; Dewey 1916; Fenwick 2001, 2003; Luria 1979; Piaget 1936; Revans 1982; Vygotsky 1978; Wenger 2000). The level of participation in group interactions, discussion and material practices was thus the second indicator that we chose.

Understanding. Learners have to understand the relevant conceptual and practical issues if they are to change their frames of reference, knowledge, and ways of thinking and acting. Understanding thus is a third indicator of the mental attitudes that favour the construction of new personal knowledge.

To obtain a shared and uniform score of the learners' levels of attention, participation and understanding, during the interviews we asked the teachers how they usually evaluated them. We compared their answers to the literature about classroom assessment (Popham 2004) and the assessment of attention (Gordon and Mettelman 1988; Robertson et al. 1996), participation and understanding (Stiggins 1997). To score participation, for example, the observers took notice of how many questions were posed by the participants, of their willingness to take part in exercises like role-play, group games and activities, etc. The participants' capability to reorganise and reframe concepts in their own words was one of the indexes of understanding; their keeping their gaze on the educator or on the slides was an index of the group's attention, and so on.

Scales of the learners' attention, participation and understanding were also present on the scoring sheet. They are reported in Table 2. The level with which each attitude was manifest could be marked on a Likert scale ranging from 0 (the attitude is not manifest in the audience – for example, the learners do not pay attention to the teacher, they are unwilling to participate in discussions or group games, the questions that they pose show lack of comprehension, etc.) to 5 (the audience is manifestly interested, willing to participate in discussion, posing relevant questions, etc.). Of course, what was observed here is collective attitudes as they may emerge from many individual streams of behaviours, and hardly resembles how attention or understanding is defined or assessed in an experimental psychology laboratory. Yet, it appears to more closely resemble what teachers may actually do in a classroom.

Empirical observations in the classroom

Settings and participants

Fifteen training courses for adults, each involving different educators, learners and topics, were observed.

All the courses took place in classrooms in the city of Torino, Italy. Each lasted one to three days (mean: 1.5), divided into lessons of about four hours (range: 3–6) during which interactive games, classroom discussion and theoretical explanations took place. The topics ranged from project management to the use of computers to leadership, etc.; courses with different topics were chosen to avoid biases due to the contents.

The classroom contexts were very similar; present were the participants, the educators and the observers. The average attendance was 20 persons (range: 16-53) with a mean age of 40 years (range: 18-60), typically aiming at professional qualification or requalification.

The educators (one for each course) were eight women and seven men, with an average age of 43 years (range: 26-53). Eight of them had extensive professional experience (more than five years working in the field and/or a postgraduate degree in adult education). Neither the educators nor the participants were aware of the nature or the goals of the observations.

Observers, materials and methods

All the courses were observed by the same team of three judges. These were two psychologists and a senior student in psychology. One of them is a co-author of this paper; the other two were exclusively recruited for the observations, which they accepted to do as a favour to the authors or as part of their thesis.

The observers did not participate in the interactions; if questioned about their activities, they were to speak vaguely about 'the observation of group dynamics'. Their presence, however, appeared to be quickly forgotten.

The task of the observers was to fill in a copy of the scoring sheet every 30 minutes, evaluating each item on its Likert scale in reference to its progress during the previous half hour. As mentioned in the previous section, the Likert scale for each item ranged from 0 to 5. The educators were scored on the list of 31 relevant behaviours reported in Table 1; the participants were collectively scored on the levels of attention, participation and understanding as reported in Table 2. The scoring sheet, in other words, was a graphical rearrangement of these two tables.

The observers gave their scores independently. To improve inter-rater reliability, they were trained on a set of pre-test observations, analogous to those that they would conduct later, with ample opportunities for discussion and exchange of ideas. At the end of the training program, a high level of total agreement was achieved (Cohen's $k = .93$).

Results

Factor analysis: Grouping behaviours into attitudes

We used factor analysis to group the educators' indexes, collected as described above, into more complex interpersonal attitudes. The underlying idea was that the minimal, instant-by-instant behaviours represent the visible manifestations of the more general interpersonal attitudes by which the educator frames and constructs her guidance of the classroom. Technically, these general attitudes may be viewed as latent variables that find their reflective indicators in the educator's behaviours.

Factor analysis may be useful in the search of a structure underlying a data matrix and for data reduction (Cohen 2001; Diamantopoulos and Siguaw 2006; Jarvis, MacKenzie, and Podsakoff 2003). In this perspective, such a technique 'takes what the data give': it does not set a priori constraints on the estimation of the components or on the number of components to be extracted, and for many researcher this is its most appropriate application. The overall purpose of factor analysis is to find a way of condensing (summarizing) the information contained in a number of original variables into a smaller set of new, composite variables (factors) with a minimum loss of information. More specifically, our use of factor analysis had three goals:

(1) To identify the structure of the relation among the variables (*R* factor analysis: to analyse a set of variables to identify the dimensions that are latent and that are not easily observed).
(2) To identify representative variables from a much larger set of variables for use in subsequent multivariate analysis.
(3) To create an entirely new set of variables, much smaller in number, to partially or completely replace the original set of variables for inclusion in subsequent techniques (correlations).

To decide the number of factor to extract:

• first we extracted the largest and best combinations of variables, and proceeded to the smaller, less understandable ones;
• after the initial solution had been derived, we tried several more solutions;
• finally, based on these further trials, the factor matrices were examined, and the best representation of the data was used to assist in determining the number of factors to extract.

Factor	Eigenvalue	Explained variance (%)
Favouring cooperation	10.183	29.10
Directivity	4.237	12.10
Flexibility	3.746	10.74
Focusing on the group	2.639	7.50
Total		59.50

Table 3. Eigenvalues and percentage of explained variance.

Label	Favouring cooperation	Directivity	Flexibility	Focusing on the group

While exact quantitative tools for deciding the number of factors to extract have not been developed, we used the most common stopping criteria:

- Latent root criterion: we first used the most common technique, which consists in extracting the factors having latent roots or eigenvalues greater than 1 (all the factors with latent root less than 1 were considered insignificant).
- after this first selection, in order to achieve the second and third goals described above, we looked at the factor loadings, because the number of factors is interrelated with an assessment of structure as is revealed in the interpretation phase;
- then, we used the Percentage variance criterion to identify the best solution: the one that we found accounts for 59.50% of the total variance;
- at the end of the process we opted for the rotation of factors to achieve a simpler, more theoretically meaningful pattern (Cohen, 2001);
- the last stage of the analysis was the interpretation of factors using factors loadings, as discussed below.

The four factors which we identified as the most satisfactory solution were:

- favouring cooperation;
- directivity;
- flexibility; and
- focusing on the group.

Table 3 reports the eigenvalues and the variance explained for each factor. Table 4 reports the results of factor analysis with the relevant loadings for each item. In accordance with the literature (Cohen 2001), we considered loadings ±.50 significant, and loadings ±.80 extremely high, and assigned the label and the meaning to each factor based on the item that presented the highest absolute loading (Table 4).

Favouring cooperation

Answers immediately	-0.211	0.768	0.068	0.011
Closed question	0.098	-0.486	-0.23	0.343
Enjoyable climate	-0.557	-0.486	0.092	0.053
Gives orders	-0.482	0.187	-0.365	0.158
Gives own opinion	-0.283	0.742	-0.052	0.182
Group's example	0.115	-0.325	0.104	0.457
Interrupts digression	-0.445	0.013	-0.667	-0.029
Interrupts intervention	-0.157	0.843	0.019	0.085
Judges	-0.818	0.348	-0.136	0.046
Keeps focus	0.13	0.017	0.737	-0.124
Leaves time	0.748	-0.429	0.083	-0.018
Long example	0.483	-0.317	0.446	0.184
Looks at every one	0.495	-0.315	0.591	-0.096
Makes decision	-0.876	0.224	-0.002	0.066
Moves in classroom	-0.53	0.279	0.229	0.405
Open question	0.223	-0.732	-0.062	0.332
Paralinguistic fluency	-0.265	0.343	0.676	-0.149
Participant's example	0.513	-0.144	-0.17	0.491
Personal example	0.173	0.057	-0.112	-0.606
Prosody	-0.306	0.338	0.604	0.217
Rambling	-0.865	0.171	-0.017	0.06
Reduces time	-0.11	0.028	-0.087	-0.563
Reformulates question	0.785	0.004	0.188	0.245
Reformulates remark	0.809	0.098	0.184	0.377
Returns question	0.112	-0.83	-0.11	0.223
Rewords concept	0.262	-0.057	0.421	0.073
Scaffolding	-0.099	-0.48	0.508	0.412
Talks a lot	-0.541	0.664	-0.088	0.077
Universal example	-0.056	-0.323	0.101	-0.276
Uses first names	-0.504	-0.165	0.169	0.582
Uses jargon	-0.332	0.173	-0.57	0.188

Table 4. The loadings of the four factors from factor analysis for each type of behaviour performed by educators.

This factor reflects the teacher's ability to elicit, welcome, and value contributions and opinions from the audience. The behaviours that pertain to it and their respective loadings are:

Educators subgroup	Educator's attitude	Mean	SD	Participants' attitude	Mean	SD
Novices	Favouring cooperation	-.87	.92	Attention	3.62	1.06
	Directivity	.14	.78	Participation	2.41	1.23
	Flexibility	-.27	1.24	Comprehension	3.27	1.23
	Focusing on group	-.06	1.29	—		
Experts	Favouring cooperation	.60	.51	Attention	4.21	.84
	Directivity	-.10	1.31	Participation	4.28	.84
	Flexibility	.20	.73	Comprehension	4.03	.73
	Focusing on group	.04	.73	—		

Table 5. Means and standard deviations of the educators' relational attitudes and the learners' mental attitudes; the group of educators was split between novices and experts.

	Novices			Experts		
Educators attitudes	Group index	Pearson	p	Group index	Pearson	p
Favouring cooperation	Attention	.693*	<.001	Attention	.093	=.500
	Participation	.491*	<.001	Participation	.529	=.500
	Comprehension	.053	=.911	Comprehension	.181	=.290
Directivity	Attention	-.182	<.304	Attention	-.039	=.424
	Participation	-.153	=.387	Participation	-.281*	<.001
	Comprehension	-.849*	<.001	Comprehension	-.172	=.371
Flexibility	Attention	.152	=.039	Attention	.413*	<.001
	Participation	.707*	<.001	Participation	.571*	<.001
	Comprehension	.876*	<.001	Comprehension	.341	=.07
Focusing on group	Attention	.303	=.082	Attention	.309*	<.001
	Participation	.046	=.794	Participation	.277	=.051
	Comprehension	.182	=.696	Comprehension	.368*	<.001

The asterisk (*) denotes statistical significance ($p < .001$).

Table 6. Correlations between educators attitudes and group indexes.

- reformulates a remark made by a participant (.809);
- reformulates a question posed by a participant (.785);
- leaves participants time to reflect and intervene (.748);

- talks incessantly (-.541);
- uses an example provided by a participant (.513);
- is judgemental about the opinions expressed by participants (-.818); and
- makes decision about activities and proceedings (-.876).

Taken together these variables suggest a general attitude of the educator's to put herself on the same level with the participants in terms of personal contribution.

Directivity

This factor describes the educator's tendency to compel agreement with her agenda or opinions. Its composing behaviours and their respective loadings are:

- interrupts an on-topic intervention (.843);
- answers immediately a question posed by a participant (.768);
- expresses personal opinions (.742);

- talks incessantly (.664); and
- asks open question (-.732).

Taken together these variables suggest a tendency of the educator's to use her knowledge and dominant position to direct the proceedings without giving the learners space to contribute.

Flexibility

This factor describes the educator's tendency to take the learners' views into account. The behaviours that are grouped here and their respective loadings are:

- keeps the focus (.737): this is referred to the educator's ability to leave the learners free to explore new knowledge without losing focus;
- moves and speaks in fluid, fluent and varied ways (.676);
- maintains a varied and fluent prosody (.604).

Taken together these variables describe a flexible behaviour in the management of both the contents and the communicative channels.

Focusing on the group

This factor describes the educator's tendency to focus on the group and to keep contact with it. The main behaviours and their respective loadings are:

- uses first names (.582);
- reuses an example provided by a participant (.491);
- reuses an example taken from previous classroom history (.457);
- moves around in the classroom (.405); and
- uses a personal example (-.606).

Taken together these variables describe the educator's ability to stay connected to the participants and their contributions rather than on predefined schedules and flows.

Splitting the group of educators according to their level of expertise

After identifying the four main interpersonal attitudes of the educators we examined their correlations with the learners' indexes.

We began considering possible differences related to the educator's level of expertise. There is evidence in the literature that a teacher's experience (Brekelmans, Wubbels, and den Brok 2002; Darling-Hammond and Sykes 2003; Monk and King 1994; Wenglinsky 2000) or her formal training (Wenglinsky 2002) may affect students' achievement. We decided to consider expert teachers those who had more than 5 years as professionals and/or possessed a relevant postgraduate diploma. Analysis of variance (ANOVA) test showed that the experts scored higher than the novices in cooperation ($F = 123.804$; $p < .01$), directivity ($F = 5.448$; $p < .01$) and flexibility ($F = 5.449$; $p < .01$). No significant difference was found in focusing on the group. Significant differences between the two groups of teachers were also found for attention ($F = 90.89$; $p < .01$), participation ($F = 20.72$; $p < .01$) and understanding ($F = 123.804$; $p < .01$) in the respective audiences.

These results are reported in Table 5.

We made separate correlation analyses for each subgroup of educators. The results are reported in Table 6.

Novices

The courses taught by novices showed a remarkable variability in both the educators' and the learners' indexes. This is in agreement with the literature to the effect that novices appear to be more sensitive to contextual factors, showing considerable differences in their management of interpersonal relations from class to class (Brekelmans, Wubbels, and den Brok 2002). The teachers' cooperative orientation correlated positively with the learners' participation and attention ($p < .001$). Flexibility correlated positively with participation and understanding ($p < .001$). Directivity correlated negatively with attention and understanding. These data corroborate the hypothesis that the educator's cooperative and flexible attitude impacts positively on learning, while an authoritarian attitude impacts negatively.

Experts

The courses taught by experts showed a very low variability in teaching styles and high levels in the learners' indexes, thus being apparently more successful. The teacher's directivity correlated negatively with participation ($p < .001$). Focusing on the group correlated positively with attention and understanding ($p < .001$). Flexibility correlated positively with attention and participation ($p < .001$). Cooperative orientation did not correlate significantly with any of the learners' indexes; however, this probably is due to the combination of high scores and low variability that these teachers exhibited (Slavin 1980, 1983).

Discussion

Overview

We presented the results of a set of empirical observations conducted during courses with adult participants. The researchers observed interactions in the classroom and scored indexes of the educators' behaviours and of the learners' attitudes.

We view attention, participation and understanding as individual, intrapersonal predispositions of a learner's mind to move in new and appropriate directions. The educators' attitudes are instead relevant to interpersonal interaction: they may be viewed as predispositions to address the audience in certain ways. Both types of attitudes become manifest in the actors' respective behaviours. Behaviours are the material counterpart of an actor's plans and actions, which are in turn inspired by the actor's attitudes and overarching mentality. To speak of 'behaviours' is not a renouncement to constructivism and a return to realism. Actions, as opposed to mere body movements, exist only in the meanings that the actor and the possible observer(s) ascribe them. The meaning of any communicative and interpersonal action is the shared construction of the participants (Tirassa and Bosco 2008). The teachers and the learners whom we observed, as well as the observers themselves, shared a common socio-cultural heritage; unsurprisingly, they reckoned similar meanings in subjectively viewed classroom interactions: not because behaviours convey objective meanings, but because all human beings, or all human beings belonging to a certain context, share certain ways of viewing each other and the world.

There were three stages in the elaboration of the data collected. First we grouped some minimal behaviours that an educator may perform into more general interpersonal attitudes of hers. Then we compared the performance of expert and novice educators. Finally, we compared the educators' interpersonal attitudes and the indexes of the learners' knowledge construction.

The four interpersonal attitudes

We used factor analysis to group the educators' behaviours into four main interpersonal attitudes: favouring cooperation, directivity, flexibility and focusing on the group. Each may be represented as a continuum ranging from 'seldom manifested' to 'continually manifested'.

Favouring cooperation

Behind the many different actions by which an educator may affect and govern interactions and communication in the classroom is her attitude toward cooperation in the local situation. Cooperative interactions are characterised by a relaxed climate and uncomplicated communication. This factor reflects the teacher's ability to elicit, welcome, and value contributions and opinions from the audience. Among the behaviours which we coded, those that most clearly manifest a cooperative attitude are: to welcome and reformulate or reframe the remarks made by the participants, to reformulate the questions posed by the audience so to let the participants find an answer by themselves, to leave participants time to reflect individually or collectively and intervene and to reuse the examples and remarks provided by the audience. A non-cooperative attitude is manifested by behaviours such as to talk incessantly, to make decisions that do not take the group's desires and opinions into account, and to be judgemental about the audience's interventions.

Directivity

Leadership of a group may be exerted in different ways. This factor describes the educator's tendency to compel the audience to agree with her agenda and opinions. This attitude becomes more manifest as the teacher answers questions immediately without leaving time for reflection, talks incessantly, expresses personal opinions and interrupts interventions even when learners are on-topic; it is less manifest when she poses open questions.

Flexibility

The teacher's agenda should take the learners' views into account. A flexible attitude is manifested when the teacher values questions and comments even though they are not strictly on-topic, when she moves and speaks in fluid, fluent and variable ways, when she favours group discussion, and, since to be flexible does not mean going off-topic, this attitude also includes the ability to keep the focus on the main topic, for example by helping the participants to contribute to it.

Focusing on the group

This factor hints to the educator's tendency to focus on the group and to maintain interpersonal contact with it. Among the behaviours that make such attitude manifest are to move around in the classroom, to use first names and to reuse the examples provided by the participants. These behaviours may also be viewed as signals of a low level of anxiety in the teacher, resulting in a greater capability on her part to focus on the group.

The first two factors, namely a cooperative orientation and a low directivity appear to be the most significant. The first alone accounts for as much as 29.10% of the total variance.

We are not suggesting that a list of behaviours like ours should be viewed as a recipe for success, that is, that it would be sufficient to reel off certain bodily movements or type of sentences, or to feign certain attitudes, to achieve professional success in the classroom. Experience may certainly help develop certain interactional routines, but a forced performance would probably be counterproductive. We believe that the general attitudes count more than the manifest behaviours: inasmuch as they have become part of how an educator views her professional world, her manifest moves will merely function as hints for the audience to move forward.

Expert versus novice educators

In accordance with the literature (e.g. Hogan, Rabinowitz, and Craven 2003; Wenglinsky 2002), we found evidence that expert and novice educators enact these four interpersonal attitudes differently.

There are two facets to any act of communication, respectively relevant to the contents and to the relation between the interlocutors (Watzlawick, Beavin, and Jackson 1967). If we take it

for granted that the average educator knows the matter she is teaching, as all those whom we observed did, the other factor that crucially influences the proceedings in the classroom is her ability to create and maintain a fruitful relationship with the participants.

Actually, a novice may be even more up-to-date than an expert regarding the technical contents of the course. Therefore, the difference between the two subgroups of educators appears to depend on the respective skills in conducting group interaction. This conclusion is also supported by the data from the subgroup of novices, within which those with the highest score at favouring cooperation also obtained the highest scores in the group's attention, participation and understanding.

The relation between the educators and the learners

Correlation analysis showed covariance of the educators' interpersonal attitudes and the learners' levels of attention, participation and understanding. In particular, the higher the educator's score was at favouring cooperation, the higher were all the indexes of the learners: the entire learning process is bolstered when the teacher stimulates active participation from the audience (Slavin 1980, 1983). Our results confirm the idea – common in the practice of adult education – that a cooperative climate is better in guiding the class toward a shared construction of knowledge (Goh and Fraser 2000). Favouring cooperation correlated with attention and participation, at least in the novices' dataset, while the lack of such correlation in the subgroup of experts probably depends on the small variability in the relevant dataset.

A type of action that appeared to be important in favouring cooperation is the use of examples. Examples may be universal (that is, historical, generic, or abstract) or may be taken from the educator's personal experience, from the previous experience of one of the participants as he reports it, or from the history of the previous events occurred in the classroom. The latter turned out to be particularly relevant to cooperation. Noteworthy events often happen in the classroom that may be taken as prototypical of certain concepts or of certain ways of the human beings. The educator can reinterpret and reuse them on a later occasion as examples of something she is discussing. Meaningful links are thus created from concepts that might otherwise appear abstract and unintelligible to real experiences that all participants share. This is one of the moments when the importance of cooperation in the collective and individual construction of knowledge shows most clearly.

Directivity correlated negatively with understanding in the subgroup of novices and with participation in the subgroup of experts. This is consistent with the paradigm of self-directed learning (Houle 1961; Merriam and Caffarella 1999; Tough 1967, 1971), which emphasises the importance of letting learners influence the learning process by negotiating their desires about its contents and dynamics with the teacher.

Flexibility correlated positively with participation and understanding in the subgroup of novices and with attention and participation in the subgroup of experts. When the participants have a degree of freedom in the management of the contents and of the overall agenda, they appear to be more inclined to pay attention to the ongoing interaction and they better understand the issues at hand. This is consistent with the idea that what really facilitates learners' success is not whether their learning styles match or mismatch a specific teaching programme or strategy, or the teacher's cognitive characteristics, but the very process whereby personal learning styles are reckoned and taken into account (e.g. Coffield et al. 2004; Constantinidou and Baker 2002; Evans and Waring 2009; Glenn 2009; Massa and Mayer 2006; Pashler et al. 2009). Our results also confirm that, as is assumed in the paradigm of self-directed learning (Brookfield 2009), the more the learners are allowed to participate responsibly, the better their attitude is toward the construction of knowledge.

Adult learners need to feel involved as active participants during the entire learning process and able to negotiate the relevant decisions with the rest of the group and with the educator (Knowles 1980; Merriam 2001). The perception, both individual and collectively shared, that they are entitled to as much freedom in deciding the learning goals and strategies as possible, makes them jointly responsible with the educator for the ultimate results of the endeavour. The learners thus feel that they are the actual focus of the process (self-centred, self-directed

learning) and that the educator is, truly, a facilitator. This motivates not only to move toward the ultimate desired results, but first and foremost to entertain a positive attitude toward the situation and to participate in its proceedings.

In the subgroup of expert teachers, focusing on the group correlated positively with attention and understanding. As mentioned above, this may be related to a low level of anxiety on their part. The educator's focus on the learners also helps the latter feel that they are at the centre of the process. This attitude appears to be the most difficult to control. Focusing on the group requires spotting the relevant cues from the dynamic flow of events, which requires a remarkable mastery of attention (Nideffer 1995). The point is not to be constantly focused on the other persons, but to constantly, effectively and efficiently use attention as a distributed, selective, divided, etc. capability. Less experienced educators may have a hard time attempting to do so, which showed in our data as the ineffectiveness of such attitude to influence the learners' indexes. Even the subgroups of experts showed a high variance in this attitude; unsurprisingly, those with the highest scores at focusing on the group were those with the strongest capability to influence the audience.

What skills of the educators' are the most important?

A few specific conclusions can be drawn from our data about certain behaviours of the educators. For example, interrupting an intervention from the audience, whether on-topic or off-topic, appears to imply the denial that all contributions are in one way or another relevant and useful to the proceedings. Actually, any action that interrupts the expression of personal ideas may end up hampering learning: even if what a participant is saying is 'objectively' wrong or off-topic, it is important that the educator allows enough time for him to express it and for the rest of audience to understand and frame it. Sometimes, the best skill of the experienced educator is her use of silence.

The teacher can also reformulate a question to better frame it or to provide hints to the answer. The fear to be resisted here is that the audience may think that she just does not know what to say. Often, indeed, there is no right answer and the educator could only give her personal opinion; however, her goal should not be to have the audience agree only because they fail to see an alternative; furthermore, to provide an answer immediately would put them in a substantially passive role. The educator's goal, instead, is to construct an appropriate answer together with the audience: this may turn out to be different to what she would have thought in a different context, but what really matters is to let the participants develop and consider their own results and knowledge. Of course, the educator is there to help in this process and may provide her preferred solution at the end of it.

Another moment when the educator values the participants' contribution occurs when she welcomes a comment received and reframes or reformulates its contents, premises or consequences. After doing so, it also appears to be useful to ask the participant whether such reorganisation corresponds to what he actually meant. This way the participants become more aware of their individual and essential contributions to the construction of knowledge.

In the end, what appears to really matter is not to keep a close focus on or control of the topic at issue, but to maintain as strong a relation as possible with the ongoing psychological dynamics of the class.

Limitations and possible directions for further research

Overall, our findings support the idea, widely diffused in the socio-constructivist literature (Luria 1976, 1979; Vygotsky 1978; Vygotsky and Luria [1930] 1993) and elsewhere, that learning is a transformational process that takes place within an interpersonal context. What they specifically contribute is the empirical evidence that the interpersonal contexts – and, consequently, the learning process – can be influenced by the educator, and that there are many differences in how expert and novice teachers do so.

The main suggestion that we would like to advance, thus, is that it is possible to develop empirical research in the highly complex area of adult education and adult learning.

This said, we see a vast array of possible improvements to our research. Many variables were not included in the model and are therefore out of experimental control. We are also aware of the methodological limits that can be ascribed on the one hand to the small size of the observed sample and on the other hand to the comparative uniformity of the learning contexts we observed. Another limitation, which is instead intrinsic to the methodology we used, is that, despite the training session which the observers underwent, mistakes and misunderstandings in the scoring process cannot be excluded with certainty. It is also possible that we used too few indexes, or indexes that do not correspond exactly to the mental states of the participants. This again appears hardly avoidable. A different way to assess the same proceedings would be to directly interview the participants about their mental state; of course, however, it would be impossible to do so every half hour during classroom interaction. Finally, appropriate tests to evaluate actual learning should be developed and used.

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