

Distance Education in the School Environment: Integrating Remote Classrooms by Video Conferencing

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INTRODUCTION Over the last few years there has been a growing interest in using modern information and communications technologies to support teaching and learning. In sparsely populated areas (for example, in Australia, Canada, and the United States) there are traditions in the use of distance education at the school level. In Europe, too, there have been many projects involving the use of modern telecommunications in education, with encouraging results. (Veen *et al.* 1994). A transition from print and postal-based materials traditionally used in distance education with adult learners to the more interactive and technology-based systems has been apparent. Modern technology used in school and classroom settings open possibilities for teaching and learning. Although there has been discussion about the use of telecommunications in education (for example, Mason, 1995), further research in different instructional and institutional settings is still needed.

This article is a part of the Kilpisjärvi-project, which is being carried out in Finland during 1994-1997. In this project two lower secondary level classrooms, one in Helsinki and one in Kilpisjärvi, have been integrated by video conferencing and audiographics systems. The key term of this study is *classroom-focused distance education*. It is used to refer to distance education occurring in a school environment as distinct from distance education occurring on higher and adult educational levels. As the frame of reference of this article is quite closely

connected to the Kilpisjärvi-project, a brief overview of the project is necessary.

The local authorities of the Village of Kilpisjärvi situated in the northwestern, corner of Finnish Lapland, decided in 1993 to extend the scope of their village school, which had previously catered for pupils in grades 1-6 (primary school), to include the upper level of the comprehensive school (grades 7-9). This made it possible for the six pupils concerned to stay in the village and live at home instead of attending a boarding school. Kilpisjärvi village is isolated, over 110 km away from the nearest village. Parents were aware of the educational disadvantages of a small rural school with very few connections to the outer world. As the resources available were limited, it was considered appropriate to initiate a cooperative project in distance education with the University of Helsinki.

The Training School of Helsinki University agreed to become the cooperative agent in this venture. This school is one of the two training schools belonging to the Department of Teacher Education, University of Helsinki. With modern communication technologies these two classrooms, one in a big urban school, the other in a small rural school over one thousand kilometres away are connected to each other to form one classroom. In the ongoing project, technologies are used to mediate between urban and rural environments and interests. The Department of Teacher Education is interested in research on such cooperative projects and in

giving teacher trainees experience in distance education as well as creating new teaching/learning perspectives through the use of advanced communication technologies (Salminen, 1995, 1996; Salonen and Falck, 1996). Additionally, the project aims to seek out novel ways of supporting small rural schools and communities (Kynäslähti and Salminen, 1995; Stevens 1995, 1996).

The basic approach of this article and its theoretical considerations come mainly from conventional classroom education. The theoretical and practical considerations of the instructional process in general belong to the research pattern primarily used in conventional education. Research on classroom focused distance education is based largely on the idea that the main difference is the mediated communication between teacher and pupils and between pupils in two different classrooms. This does not presuppose the reconceptualisation of the educational process itself for distance education is regarded as education at a distance. Garrison and Shale (1990, 31) prefer the latter expression because, according to them, 'the most important feature for characterising distance education is not morphology, but how communication between teacher and student is facilitated. Because the teacher and student are physically separated, distance education must rely on technology to mediate the communication process.'

The theoretical framework, presented in this article, and its practical applications contain features of distance education and virtual class. The study and the project aim to integrate and balance elements from these two families of education into one experiment testing new ideas and technologies in teaching and learning in a school environment.

CONVENTIONAL VS. DISTANCE EDUCATION Distance education within school settings is still relatively novel. According to Keegan (1989, 9), within distance education there is a quite strong tendency to separate two distinct dimensions – conventional group based-education¹, and individually oriented distance

education. Conventional education is mainly associated with children and adolescents in school settings while distance education is usually associated with adults and their professional training in its various forms. Whereas school education is mainly compulsory, distance education is primarily based on voluntary principles. Keegan (1989, 13) argues that this distinction has led to a crude dichotomy according to which students either attend schooling institutions or they study at a distance. This practical dichotomy has also led to two disciplines in the area of educational sciences, namely education and distance education, which have both shared and distinct interests (Garrison, 1993; Evans, 1991a).

Although there are differences in practice, Evans sees that broadly the discourses of conventional education and distance education overlap to such an extent that one might have expected distance education to be a part of education in general, not a separate discipline of its own. According to him, this development is mainly due to an 'unfounded faith in technology and associated myths and untested assumptions' even if the practices of distance education are essentially educational, rather than technological, in nature (Evans, 1991a, 10).

Schooling at a distance, however, seems to be of marginal concern within both disciplines, at least in the area of research, even if it has obvious similarities with both distance education and education in general. Primary and secondary education are emerging in the studies of distance education together with modern technologies in use (Husu *et al.* 1994; Husu, 1995, 1996; Postle, 1995; Stevens, 1994, 1995, 1996; Wibe, 1995). The theoretical and practical distinction between education and distance education is now, at least in some sense, blurred or merged by the stance taken in this study where two separate classrooms are integrated into one instructional process by using video conferencing.

At first sight distance education within and between school classrooms seems to be quite an orthodox venture. In what sense can it be? Evans (1991a, 10) argues that criticism of this

kind mainly stems from the situation which prevailed in the field of distance education. If distance education had sprung from education, then distance schooling would perhaps have been a central theme within the discourse of distance education itself. But because of the separate traditions we need to analyse and clarify some of the main concepts of distance education in order to bring these two families of education closer together. In this respect the concept of distance is important. When we talk about distance education we tend to assume that teachers and students are separated geographically and that interaction between them is very restricted. And on the contrary, when we think about the instructional process in the conventional face-to-face classroom, we are tempted to presuppose the close network of sophisticated human interactions in which every one is near and no one is distant. But what does distance mean in these two cases?

Moore (1993, 22) proposes the concept of *transactional distance*, distance which is not simply a geographic separation of teachers and students, but a pedagogical concept that describes teacher-learner relationships when both parties are separated by space and/or by time. Distance education has this special characteristic of the separation of teachers and learners and it is believed that it leads to special patterns of teacher and learner behaviours. According to Moore (1993, 22), there is a psychological and communications space to be crossed ... and it is this psychological and communications space that is the transactional distance'.

Psychological and communications spaces vary from learner to learner and from teacher to teacher. This indicates that transactional distance is continuous rather than a discrete variable. Rumble (1986) has pointed out that even in conventional face-to-face education there is transactional distance between teachers and learners. Pupils' experiences of the instructional process often differ quite drastically from teachers' experiences. In other words, in conventional education there is also a psychological space to be crossed. The evidence

gathered from the studies of the instructional process (Bellack *et al.* 1966; Koskenniemi and Komulainen, 1974) points out that the intentional communications space is usually taken by the teacher while pupils are mainly responding to teacher initiatives. Teachers tend to capture the majority of the communications space available and leave much less to pupils even if education is characteristically described as an interactional affair between both parties involved.

According to Modra (1991, 88), the dichotomy between conventional education and distance education is often artificial because it is based on idealised images of both disciplines. In conventional face-to-face education pupils are quite rarely in a sort of pedagogical situation where they can enjoy the balanced and sophisticated interactions between their peers and their teachers. Instead, teachers seem often to have to cajole passive pupils. In distance education the focus seems to centre on the use of technology. The educational processes of distance education, that is, those connected with the practice of teaching and learning at a distance, are often little discussed. (Evans, 1991b, 180). It is as if distance education was just about selecting a body of knowledge and communicating it via one or more technologies. The stance is quite analogous to the often occurring situation in classrooms where the teacher selects a body of knowledge and just delivers it to the class.

Interaction between teacher and students, and among students, is fundamental both in conventional face-to-face education and in distance education. In both cases, the pedagogical approaches taken largely frame and establish that interaction. In this sense, it is the organisation of pedagogy which is the important educational issue for both families of education and the matter of technology² forms only a part of the context in which distance education, and education in general, takes place (Clark, 1983; Winn, 1990; Campion, 1991).

EDUCATION AT A DISTANCE The use of distance education has expanded in terms of

both student and institutional participation. This development has also brought with it various delivery systems together with miscellaneous teaching methods used within distance education. As a result of these changes it is often quite difficult to differentiate between conventional and distance education. Both forms of education have come nearer to each other and this has led to a reconsideration of what distinguishes distance education from other forms of education.

The blurring of boundaries between the two has made it more evident that the major and the most common feature in both forms of education is the process of interaction among teacher, students, and subject content. The main difference is that in distance education most interaction between teacher and students is mediated by communication technologies. According to Shale and Garrison (1990, 31), education and distance (between teacher and student) are concomitant features but it is clear in practice that we are attempting to provide educational opportunities for students who just happen to be physically separated from a teacher (or from other students). The authors argue that the definitions of distance education usually tend to reverse this emphasis and are preoccupied with various features of distance. Viewing distance education from the perspective of the technological media used to achieve it obscures the fact that in all instances the goal is education (Shale and Garrison, 1990, 31).

This kind of definition does not necessitate a reconceptualisation of the educational process itself. Instead, it emphasises the basic challenge of the educational process, that is, how to facilitate interaction between the teacher and students, and among students. Whenever the teacher and students are physically separated distance education must rely on technology to mediate the interaction process between both parties. Shale and Garrison (1990, 31) stress that considerable attention has been given to the use of technological media while less attention has been paid to the nature of interaction processes and the role of technologies supporting it. It is not the technological solution in itself that can be regarded as education but the educational

content and the appropriate didactic use of the medium applied.

With the emergence of modern technologies, teachers and students in conventional education find fewer practical and methodological concerns over the delivering education at a distance. At the same time the methods of distance education are becoming more like those used in modern conventional group-based education. For example, the technology used in this study, video conferencing, can be viewed as a group method of learning that provides a real-time interaction between the teacher and students in a manner similar to traditional classroom instruction.

If one accepts the view of distance education as an educational mode, or as a teaching mode, it is relevant to apply to it the problems and possibilities that usually are involved in conventional teaching have to be adapted to educating at a distance. The development of new communications technologies may encourage the merger of distance education with conventional education so that the distinctions between the two become blurred. Keegan (1989, 9) warns that this kind of approach can easily lead to seeing distance education as a good thing that alone can contribute to the improvement of conventional education. Instead, one would rather see these two forms of education dealing with the same core substance of education, namely with interaction, with appropriate methodologies in different environments. The variation of methods reflects different conceptions of the interaction processes and may offer better understanding of the educational transactions in general.

Vertecchi (1993, 156-157) argues that distance education can be fitted into schools because the idea of distance education itself presupposes the existence of a 'school', that is an organisation whose explicit purpose is to teach someone who wants to learn. Vertecchi's view has an important consequence: distance education cannot offer an exclusive alternative to conventional face-to-face education by developing systems and methods that would make the institutional education system out-of-

date. On the contrary, Vertecchi (1993, 157) argues that distance education can be viewed as a means of diversifying and specialising the conventional educational offering in response to various educational needs.

A FRAMEWORK FOR INTERACTION

Interaction in both conventional and distance education, is fundamental. In the field of distance education Hillman *et al.* (1994) give a comprehensive list of the various definitions that, for example, consider interaction as the 'fundamental element' (Shale and Garrison, 1990), as the key to the 'effective learning' (Keegan, 1990), and as a defining characteristic of education (Moore, 1989). In turn, teaching in conventional education is characteristically regarded as interpersonal, interactive activity (Anderson and Burns, 1989, 9-12).

Both forms of education are based upon an understanding of the essence of interaction in the instructional process. In its most basic form education is a process of interaction between teacher and students in order to provide the subject content of teaching. These basic elements of the instructional process – teacher, students, and subject content – can be presented in the form of an interactive framework which holds the various relations between the three elements. These relations in their basic form are described in Figure 1.

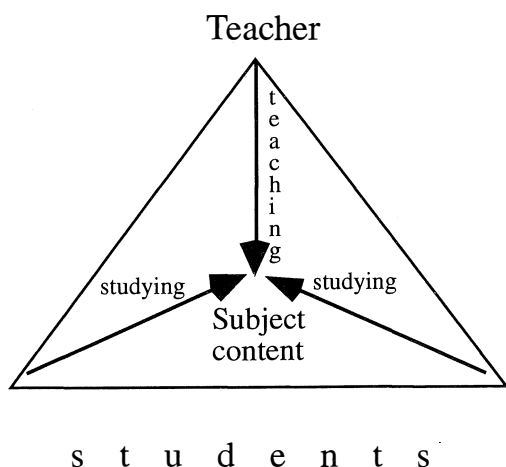


Figure 1. A framework describing interactions in the instructional process

Even if the interactive dimensions described in the framework are numerous they do not capture the total complexity of the instructional process. Instead, it is supposed that certain interactive dimensions are regarded as essential for the instructional process in general. At first sight the stance taken seems to be quite reductionistic but, according to Moore (1989, 100), interaction is a term that 'carries so many meanings as to be almost useless unless specific submeanings can be defined and generally agreed upon.' The dimensions of the interactive frame can be regarded as a minimum that educators both in conventional and distance education can agree on and perhaps further develop and refine in their teaching.

Within an interactive framework at least three types of interactions are important, namely teacher-student interactions, student-student interactions, and interactions related to the subject content of teaching (Moore, 1989; Bellack *et al.* 1966). In the field of conventional education interactions related to persons in an actual teaching situation, that is teacher-student and student-student interactions, are often emphasised. On the other hand, distance education has 'traditionally' seen the learner-content interaction as the defining characteristic of education³, perhaps a result of the history of correspondence education. With the emergence of modern telecommunications, real-time and two-way interactions between teachers and students are becoming more common in distance education. Together with this practical development theoretical considerations have also become more inclusive regarding conceptions of interaction within distance education. Amundsen (1993) has traced the evolution of the theory of distance education and found decreasing emphasis on the notions of distance and separation in favour of various forms of real-time interactions between learners and instructors.

In a classroom environment interactions related to the subject content of teaching are more mixed with person-to-person interactions. Teacher-student and student-student interactions occur on two levels: interactions are mainly group-based, but they can also be individually oriented

when teacher and student, or student and student, are in one-to-one contact during the instructional process. However, one can argue that these two forms of interactions are not separate but, instead, simultaneous since individual interactions, both teacher-student and student-student interactions, usually take place in a social presence, and often under the social pressure, of a group of students in a classroom.

Interaction during the instructional process can be either intentional or unintentional. Whenever interaction is connected with some purpose it can be viewed as intentional. Teachers' and students' intentional communication is often tied to practical activities both perform during the instructional process. Teaching is the activity of teachers and studying is the activity of students. By using the concepts of teaching and studying the instructional process can be understood as active on both sides (Kansanen, 1993). These two are linked because it is the teacher's intention to teach which defines the student's situation for his/her studying⁴.

Not everything in the instructional process is intentional in the sense of only aiming at pre-planned goals. The processes of interaction should also allow, according to Juler (1990), 'free flowing discourse' among participants. When education is mainly seen as communication (Tiffin and Rajasingham, 1995, 19-47) these unstructured elements of teaching and studying become more prominent. The educational definition (Anderson and Burns, 1989, 7-19), on the other hand, emphasises the intentional character of interaction, according to which, communication is used to promote intended student learning.

Interaction seems to be important for at least two reasons: first, a certain amount of interaction is necessary so that teachers and students can understand each other and perform their teaching and studying activities. Without this basic interactive (mutual) understanding it would be difficult to know whether teaching and studying activities respectively are focusing on the shared aims that both teachers and students intend. Seen this way, interaction is a

prerequisite for the instructional process in general. Second, teaching and studying methods are interactive to varying degrees. They can be interactive in themselves (that is, discussion method) or they can allow interaction to a lesser degree (that is, methods of student's individual studying). Wagner (1994) has made the same kind of distinction between interaction as an outcome (of the methods used) or interaction as an ever-present attribute (or prerequisite) for the instructional process. Both forms of interactions are brought together in the interactive framework used in this study.

A NETWORK OF LOCAL AND MEDIATED INTERACTIONS Research on classroom focused distance education is based on the notion that the main difference is the mediated communication between teacher and pupils and between pupils in two different remote classrooms. The approach does not require the reconceptualisation of the educational process itself for distance education is regarded as education at a distance (Garrison and Shale, 1990). In conventional education, students receive instruction through face-to-face interaction with the teacher. In distance education, students receive instruction and interact with the teacher through communications media. The formulation provides a rationale for affirming the basic elements of the instructional process in general: teacher, pupils, and subject content as presented in the interactive framework.

Both in conventional and in distance education the interactions among these three elements can be conceptually and empirically analysed. This means that interaction can be analysed not only from a theoretical and philosophical perspective but also from a functional perspective. According to Wagner (1994), the functional perspective is important because different variables of interaction need to be examined empirically in order to assess the impact of interaction in different educational contexts.

In this study the addition of a distant classroom to the instructional process changes the scene of instruction: besides the interactions in a local

classroom the instructional process now also includes the mediated interactions between the teacher and the pupils in a remote classroom and the mediated interactions among the pupils in two different classrooms. The instructional process can be seen as extended for two reasons, the addition of another group of students at a distant place and the inclusion of a new dimension of interactions, which occur simultaneously with the interactions of conventional education. This study focuses on the question of how these two communicational elements – local interactions and mediated interactions – between two remote classrooms can be handled simultaneously by one teacher.

The term 'mediated' refers to the situation where teacher and students in the remote classroom are apart and the interaction between them, and among students in another classroom, must be mediated technologically. Because of the importance of interaction in educational processes in general it is necessary to investigate how the mediated forms of interaction can be fitted into the instructional process covering these two classrooms. Mediated interactions also differ from interactions taking place in face-to-face teaching. One feature of a medium is that it mediates and anything that mediates changes what it conveys. In terms of instruction, it is a question of not only transmitting content from teachers to students, but also of establishing an effective two-way communication dynamic between teachers and students. The use of the term 'mediated interactions' instead of 'distance interactions' is intended to emphasise aspects of communications over the matter of physical distance between two classrooms. The theoretical approach of 'education at a distance' (Shale and Garrison 1990, 33-37), adopted in this study, emphasises the educational aspects of distance education over the aspects of physical distance. Accordingly, distance education depends more on the mediated acts of communication rather than the technologies used (see Clark, 1983).

The integration of a remote classroom brings new and unique dimensions, at least in a school environment, to the instructional process. The

interactions from and to the distant classroom are mediated by using video conferencing. More authors define distance education by this kind of real-time teaching at a distance to groups of students located in different places. This is made possible by new technologies that permit simultaneous two-way-interaction between teacher and students. This kind of group teaching at a distance brings distance education closer to conventional face-to-face teaching.

Garrison and Shale (1989, 3) emphasise the similarities between video conferencing and conventional teaching because, according to them, video conferencing is a 'group method of learning that provides a real-time interaction among all participants in a manner similar to traditional classroom instruction'. According to Saba (1989, 33), interactive systems can achieve virtual contiguity by sight, sound, and by sharing and exchanging teaching/studying materials and documents. Virtual contiguity is not analogous to the normal interactions that take place between the teacher and the students in conventional classroom teaching. The main difference is, according to Saba, that voice and sight dialogue are intensified beyond conventional face-to-face communication.

What is unique in classroom focused distance education is that the elements of distance education are integrated into the conventional education taking place in classroom settings. The elements of distance, and distance education, form an important part of the instructional process created in this project. According to Amundsen (1993, 73), distance itself brings a significant impact to the elements of the instructional process because it has implications for teaching role, teaching methods, students' studying methods, and student expectations. The extent and the meaning of that impact is an important research task on both the theoretical and the empirical level.

The mediated interactions of distance education are integrated into the basic elements of conventional education in the local classroom. The study emphasises the educational nature of the instructional process as described. A

theoretical framework for classroom-focused distance education is presented in Figure 2.

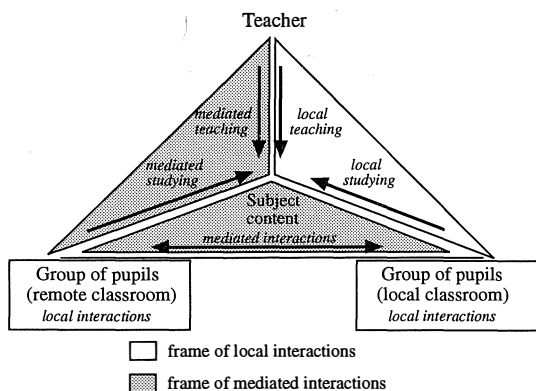


Figure 2. The instructional process in classroom focussed distance education.

The basic elements of the instructional process – teacher, students, and subject content – are held intact, but there are two types of interactions to be handled concurrently by the teacher and by the students. In addition to the local interactions of conventional classroom education the mediated interactions of distance education are occurring simultaneously. Compared with the interactive framework of conventional education (Figure 1), the instructional process in classroom - focused distance education includes a network of interactions concerning primarily the teacher⁵ but also the students in both classrooms.

The classroom is the area in which teacher and pupils communicate face-to-face. Both the teacher's teaching and students' studying, together with their mutual communication, are happening 'on-site' much as in conventional classroom teaching. However, the teacher is simultaneously connected to an another classroom and his/her teaching is mediated there by video conferencing. As Figure 2 shows, the two forms of teaching, local and mediated, are simultaneous versions of the same teaching act.

The two groups of students are also interacting both within and between groups in both the local and in the remote classroom.

In these cases there are two different kinds of student-student interactions, namely student-student interactions that take place *within* both groups, and the interactions *between* groups that are regarded as mediated interactions. These two forms of student-student interactions are occurring simultaneously in both classrooms.

The interactive network of the remote classroom differs from the interactive network of the local classroom. As Figure 2 indicates, the interactive network of the remote classroom is dominated by mediated interactions which connect students both to the teacher and to the students in the local classroom. Only student-student interactions within the remote classroom are similar to conventional face-to-face classroom education. However, the situation is different in the local classroom where the teachers' and students' interactive network is dominated by local interactions. The major part of the interactions, that is, teacher-student interactions and interactions among students within the classroom, occur on-site and they are much as in conventional face-to-face classroom education. Only student-student interactions between the two classrooms are mediated by their nature.

In sum, the instructional process in classroom-focused distance education includes two classrooms each with a different interactive network. This means that both the teacher and the students have to copewith these two distinct networks of interaction. This kind of teaching and studying practice emphasises especially the role of the teacher because, according to Dillion and Gunawardena (1995, 350), the teacher seems to be the main critical factor in the success of distance education.

CONCLUSION Since it is possible to create new learning environments by using interactive telecommunication technologies, it is important to consider how teachers and students understand the instructional process in classroom-focused distance education. Teachers' and students' experiences provide a personalised context in which both forms of

interactions are interpreted and further acted on. Therefore it is important, both theoretically and practically, to clarify how teachers and students comprehend different qualities in both forms of interactions.

The theoretical framework and the practical approach presented in this article aim to outline some essential dimensions of the instructional (especially interactive) process in classroom-focused distance education (Salonen and Falck, 1996). It is important to investigate how the setting used influences teachers' pedagogical approaches and furthermore the pedagogical roles of the teachers and the students involved. It is assumed that both teachers' teaching experiences and students' studying experiences are affected by this new learning environment.

The new interactive technologies will require further research to develop suitable instructional methods to integrate two classrooms together. The aim is to seek and to delineate conditions under which classroom-focused distance education can create one virtual classroom from the two classrooms involved. Whenever this is, at least partly, reached it will open up new learning perspectives for all participants involved.

NOTES

1. In this article the concept of conventional education is used in order to relate the dominant educational format with the distant education. Conventional does not include any value aspects or preferences and conventional education is neither 'good' or 'bad' *per se*. According to Keegan (1989, 13), 'the idea that there is something wrong with conventional education which distance education can correct is a dangerous cul-de-sac for distance educators and should be abandoned.'

2. It should be noted that technology is not restricted to distance education. Instead, according to Evans (1991b, 180), 'matters of technology involve all but the most simple

forms of face-to-face teaching, so that the classroom teacher, for example, draws upon printed materials, audio equipment, computers etc., both directly and indirectly during the course of his/her work. Arguably, technology can be seen as the tools which people use to aid their actions...'

3. According to Moore (1989, 101), 'Without it [learner-content interaction] there cannot be education, since it is the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind.'

4. It is worth noting that both teaching and studying include a wide range of activities that teachers and students are allowed to perform.

5. Even if the instructional process is intentional on both sides, it is the teacher's intentions that are more important than students' intentions concerning their studying. There are two main reasons for this: 1) During the instructional process it is the teacher who always has the responsibility to steer the process. The teacher also has the kind of legitimated power and authority in his/her actions that the students in classroom do not have. 2) When teaching takes place in the social context of the school institution it is ruled by many contradictory demands that can be best dealt with by the teacher – because of his/her legitimated and authorised position. On account of these two reasons the instructional process cannot, nor is it allowed to, be symmetrical between the teacher and students. However, this does not deny that the instructional process between the teacher and students can be as democratic and balanced as possible within these conditions (Kansanen, 1993, 54).

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