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Theory and Practice of Teaching and Learning in the Classroom – Lessons from Indian Industrial Training Institutes

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Abstract

In India, the Industrial Training Institutes (ITIs) are a vital part the Vocational Education and Training (VET) system. Previous research reveals that in addition to some other problems, it is the strongly theory-based training that impedes the transition of VET graduates into the labour market, and leads to a lack of work-readiness in young graduates. Since there is still little empirical evidence about the actual forms of teaching and learning in Indian vocational schools, this paper will examine how the learning processes in ITIs in Delhi, Coimbatore and Mumbai take place. To identify the relationship between the theory and practice of training, teacher interviews were conducted, in order to specifically examine the teacher´s beliefs and behaviours as well as classroom observations to supplement the interviews. The evidence gathered supports the thesis that ITI training is theory-driven and teacher-centred, that training is very often not practical and application-orientated, and most ITI teachers in the examined institutes have limited knowledge in the field of micro-didactics. Content knowledge and repetition of facts are more common than problem-based and learner-centred teaching.

Keywords Vocational Education and Training (VET) · India · Industrial Training Institutes (ITIs) · Teacher's perspective · Student-centred learning · Problem-based learning

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Introduction

High expectations are placed on Vocational Education and Training (VET) institutions (CEDEFOP, 2011). Individuals expect an education that promises them good opportunities on the labour market, while companies are asking for qualified employees who can productively implement their business processes. Moreover, a functioning VET system can combat social inequality and be central to a country's social and economic development. If those expectations are met, VET institutions can be of benefit to all actors involved; however, in many countries VET does not meet these demands, and often the central point of criticism is that potential candidates are perceived to be unemployable due the lack of practical experience (Blom & Saeki, 2011; Bornali, 2021; Pilz et al., 2020). Discussion about this has not only been gaining importance in Western countries and international research for years, but is also a relevant topic in developing countries like India. In many countries, we have evidence that there is an expectation that instruction will be less teacher-centered and more student-centered in order to achieve better learning outcomes (Chancalor & Chomphutong, 2004; Hua et al., 2011; Jalania & Sern, 2014; Suarniati, 2019). In India in particular, the need to reform learning processes in the VET sector is clearly evident (Pilz & Regel, 2021). However, the lack of quality in teaching, and ineffective learning outcomes, are frequently mentioned and have become more obvious (Tilak, 2018). This could be related to the strongly theory-centred teaching, which lacks practical relevance and does not place the learner at the centre of the learning process. As a consequence, the required knowledge, skills and competencies cannot be acquired, resulting in graduates who are unemployable (Neroorkar & Gopinath, 2020), and leading to a significant mismatch, with negative consequences for many stakeholders (Anikin, 2021). To counter these challenges in India, a rethinking of the delivery of knowledge, skills and competencies is often proposed, with a shift from teaching to learning and a more student-centred focus (Pilz & Regel, 2021). This way of thinking, arising from a constructivist approach, which puts situational and self-directed learning in the foreground, is being examined and discussed in the field of education, and especially VET, all over the world, and also in India (see Theoretical Background section).

Although the claim that teaching and learning in VET in India is theory-driven is frequently and strongly made, little data supporting this assertion could be generated, due to lack of empirical research (Mehrotra, 2014). However, a screening of the curricula shows that they are not competence-based in the VET sector, but that teacher-centredness is dominant (Zenner et al., 2017). Furthermore, curricula cannot always give indications on how teaching is implemented in the professional field (Zenner et al., 2017). Therefore, this paper will examine the teaching and learning, which is why the focus is also on teachers; in particular, the teachers' behaviour and conception of teaching is crucial in the transfer of knowledge in the education processes (Kaymakamoglu, 2017). There is evidence from research that teachers, as promoters of innovation, can drive change, for example, in the way teaching is delivered, even if it is not yet embedded in the curricula

(Nissilä et al., 2015). The students' perspective is not a focus in this paper, but it can be assumed that the quality of teaching and learning in VET influences the attractiveness of the educational programmes and the institutions offering them (Ajithkumar & Pilz, 2019).

Industrial Training Institutes (ITIs) are the largest and most important institutions in the VET sector in India, and are thus the focus of this paper (Agrawal & Agrawal, 2017; Wessels & Pilz, 2018). There are a total of about 15 thousand government and private ITIs in India, with a capacity of around 2.7 million training places (MSDE, 2020). Of a total of 126 training courses, 73 are technical and 48 are non-technical (plus five training courses for visually impaired people). Depending on the occupation, training can start at the earliest after the eighth, tenth or twelfth grade (Wessels & Pilz, 2018), and the duration of the training varies between six months and two years, depending on the training course (Wessels & Pilz, 2018).

To answer the question whether teaching and learning in ITIs in India are highly theory-driven, the following research questions are raised:

- What is the understanding of teaching and learning among Indian teachers in ITIs?
- How is the transfer of knowledge, skills and competencies implemented in the ITIs examined?

In the following section, the state of the art of research on the concepts and modes of transmission of knowledge, skills and competencies in the international and Indian context is presented, while the third section presents the methodology on which the research is based. This is followed by the presentation and discussion of the findings, which aims at answering the research questions. In the concluding section, an outlook on the topic in the all-Indian and international spectrum is presented.

Theoretical Background

As described above, overly teacher-centred and theory-driven education is recognized as a problem in the delivery of VET in India. The alternative is action-orientated and student-centred learning, which is intended to overcome the problems of theory-heavy teaching, such as the lack of practical relevance and the low level of application orientation (Mulder, 2017). The increased interest in, and importance of, student-centred learning can be attributed to the greater influence of the constructivist approach in instructional design (Savery & Duffy, 1996). Constructivism, compared to traditional approaches to instructional design, assumes a different set of learning assumptions, and proposes new instructional principles. These elements are the basis of student-centred learning, described by Collins and O'Brien (2003) as "an instructional approach in which students influence the content, activities, materials, and pace of learning." In addition to the focus on the learner as a subject, an orientation toward action as a learning medium, is also essential in order to achieve training that is closer to practice (Cimatti, 2016; Maitra & Maitra, 2021).

The creation of actual action situations in class, with authentic and practical tasks, plays an important role in this. What is important here, is the creation of complete practical actions, which means a combination of "acting, thinking and doing." This is expressed in the individual steps of the action-orientated tasks such as analysing, planning, deciding, implementing, controlling and reflecting, which should not be taught in isolation, but in combination (Pilz & Fürstenau, 2019).

However, in student-centred learning, in addition to the type of delivery ("How is it taught") (Billett, 1996), another point is important, which is the content ("What is taught"). Theoretical content is important in order to become familiar with the basic structures of the subject; here, the teacher is guided by the scientific structures of the specific discipline when selecting the teaching content, although, this is often not sufficient to achieve adequate employment-orientated learning outcomes (Sturing et al., 2011). Rather than purely declarative and isolated knowledge, practical, application-orientated content should be taught, which promotes competencies that are needed later in everyday working life (Dehnbostel & Dybowski, 2001; Oser et al., 2006). The focus on teaching competencies instead of isolated theoretical knowledge, increases the students' ability to act in practice, and thus their employability, as this creates a link between science and profession (Eraut, 2002). This is necessary in order to avoid the need for on-the-job training after leaving school, as a result of theory-orientated content knowledge being taught in school, instead of content combining professional practice. In this respect, competencies can be understood as skills, methods, knowledge and attitudes that can be achieved through different types of student-centred learning (Dehnbostel, 2009).

Competencies can refer to subject-specific competencies and skills, but also to methodological, social and personal competencies, such as independence, flexibility, the ability to work in a team, problem-solving skills and a sense of responsibility (Maitra & Maitra, 2021; Sturing et al., 2011) have discussed principles that are necessary in implementing such competence-based teaching in vocational education. The principles refer to the competence discussion, and are based on a constructivist approach, which is why these authors see the importance of competencies, flexibility, complexity and authenticity as well as situational orientation as central aspects for the successful implementation of VET programmes. Referring to this, de Bruijn and Leeman (2011) look at the challenges, dilemmas and practical tensions in introducing competence-based VET, and provide insights into how these can be avoided.

This way of imparting knowledge, skills and competencies, with a focus on learning and action-orientated teaching, thus also has an influence on the role of the teacher. In the student-centred and action-orientated approach, instruction is actively shaped by the learners and is not transmitted by the teacher (Tam, 2000). The teacher is seen more as a facilitator, who should promote self-directed learning and active construction of educational content by the students. According to Hativa (2000), typical methods for implementing student-centred instructional designs are summarized as discussions, group work, role plays, experiential learning, problem-based learning and case studies. The teacher should, for example, encourage the initiative and activities of the students and allow them to create their own understanding of concepts in relation to their foreknowledge and individual experiences (Brooks & Brooks, 1993). Central to how learning is actually realized in practice, is

the teacher's conviction and understanding of didactics (Staub & Stern, 2002); their perspective is decisive in determining whether teaching is student-centred or theory-based (Choy et al., 2011). Various studies suggest a connection between a teacher's individual beliefs and his or her teaching actions (Brinkmann, 2015; Kaymakamoglu, 2017; Lee et al., 2017), which is why this research uses interviews with teachers and observation of actual teaching, to find out how teaching is organized in Indian VET institutions. Fuller and Unwin (2003) relate the previously mentioned aspects, and develop a framework that deals particularly with the learning environment and the organisational context in VET. These categories are explained in more detail and differentiated in "Study Design" section, as they are of particular importance for the present research question.

Against the background that in India various quality problems, and labour market mismatches, are related to the lack of student-centred and practice-orientated teaching, it is obvious that these international approaches could at least be taken into account in the Indian context (for critical reflection, see the conclusion). Of course, adaptation to the specific type of school, especially vocational education in India, is necessary (Friedlander et al., 2014). But there is also some evidence that attempts at more student-centred teaching, are failing in India because of opposite teachers' beliefs (Clarke, 2001; Dyer et al., 2004; Brinkmann, 2016).

Because, although there is still no extensive empirical research on how knowledge, skills and competencies are taught in reality in the VET sector in India, the literature indicates that more practical elements are required (Bornali, 2021; Nerookar & Gopinath, 2020). A detailed empirical data is the crucial basis for reform and adaptation of vocational learning. This is particularly evident in relation to the existing studies on the low level of employability of graduates of vocational education programmes (Agrawal & Agrawal, 2017; Khare, 2018).

Study Design

Analytical Framework

In order to answer the research questions, and with reference to the theoretical background, the interviews and observations were analysed using the model of Fuller and Unwin (2003), which was adapted to derive the categories for the analysis. Fuller and Unwin transfer the approach of Engeström (1994) to instruction and working life, into VET, and identify two characterisations that help to describe learning environments: expansive and restrictive (Fuller & Unwin, 2003). They conclude, that expansive learning environments achieve better results in creating more effective learning opportunities. Fuller and Unwin assume that educational programs that offer a comprehensive approach to training and teaching are more likely to generate learning opportunities for all learners that create investigative learning at a deep level (Engeström, 1994; Fuller & Unwin, 2003).

Fuller and Unwin's model, looks primarily at workplace learning in relation to apprenticeship reform efforts in Europe and the UK; however, the approach can be broadened and applied to other areas as well. Although the model is initially

designed for workplace learning, it can also be adapted to the school-based VET, especially ITIs, as it was explicitly designed for the VET sector in general. Regardless of the place of learning, many aspects are similar in these areas.

The prerequisites, ideas and objectives of vocational schools like ITIs, are conceptually closer to workplace learning, which is why the model by Fuller and Unwin is more suitable here than, for example, a model from general didactics that does not explicitly refer to the VET sector. Their model is adapted to the learning processes in the school, while aspects of the model that explicitly refer to the workplace and cannot be adapted are excluded. The expansive-restrictive framework, can thus help to examine the learning culture and environment in other organisational contexts. Fuller and Unwin suggest that expansive learning environments, as opposed to restrictive learning environments achieve the broader goals that affect learning in vocational education. In Fuller and Unwin's concept, learning environments are considered in particular in terms of the role of teachers, the way they teach, the methods of learning, and the communication between teachers and learners.

Therefore, the questionnaire (e.g., "What are your teaching strategies?"; "Which learning approaches do you use?"; "What types of media do you use during a lesson?"; "How does your classroom look?" etc.) and the structuring of the results in this study also refer to these categories.

This model is complemented by the approach of de Bruijn and Leeman (2011), who address the practical tensions and challenges in the implementation of competence-based VET. They state that competence-based VET is promoted through self-directed learning, and through authentic learning situations and environments. Their model of powerful learning environments is based on this assumption, which focuses on the two aspects of self-directed and authentic learning, as well as the learning environment. Their approach of powerful learning environments shows what characteristics vocational courses should have in order to educate people and give them the opportunity to acquire understanding, flexibility, and job-related skills. This approach is based on sociocultural theories (including Billett 2001) and focuses particularly on the elements of reflective, authentic, and constructive learning from a situational perspective. These aspects were also explored during the interviews and observations and therefore examined whether knowledge transfer in Indian ITIs occurs in an authentic, constructive, reflective and situational manner and whether they thus represent a powerful learning environment according to De Bruijn and Leeman.

The two models, by Fuller and Unwin (2003) and de Bruijn and Leeman (2011), serve as the basis for this evaluation. With reference to the question at hand, five categories were derived, which provide the structure for the evaluation.

With regard to the teacher role (see 4.1), Fuller and Unwin consider the supervisor as an enabler in the expansive approach, in line with the constructivist approach (Dehnbostel & Dybowski, 2001; Kaymakamoglu, 2017); while, in the restrictive learning culture, the supervisor is seen as the controller, in line with the teacher-centred approach. In the school context, the supervisor is the teacher, which makes it clear that in both contexts the role of the teacher or supervisor is important to look at, thus, both are included as categories of the evaluation. The role of the teacher and the role of the learner, influence each other and are interdependent, which is why

the role of the learner, from the teachers' perspective (see 4.2.), will be considered in detail, in comparison to the role of the teacher. Teachers are centrally responsible for shaping instruction, especially in highly hierarchical contexts such as India. The learner is thus always perceived only in the context of the teacher.

De Bruijn and Leeman note that students gradually develop an autonomous work attitude and professional habitus through reflection on their learning and work experiences (along with teachers). This is another reason why it is important to consider the role of the learner. Closely related to the teacher's role, is his or her own understanding of teaching and learning, and his or her self-image (see 4.3). Since the beliefs of the teachers play a special role in the implementation of learning (Brinkmann, 2015; Hativa, 2000; Jambo & Pilz, 2017; Lee et al., 2017; Staub & Stern, 2002), they should be included in the analysis as a supplement. The models of Fuller and Unwin and de Bruijn and Leeman both address the forms of learning (see 4.4): In the expansive culture, these are open, self-directed and geared towards communication and the acquisition of widely varied skills in cross-disciplinary groups with authentic and situative tasks (Dehnbostel, 2009; de Bruijn & Leeman, 2011), while the forms of learning in the restrictive area are strongly limited and content-related. The authentic form of teaching, with authentic tasks performed in realistic contexts, is of particular importance. Constructive learning is stimulated by authentic learning situations that demand problem-solving learning. De Bruijn and Leeman note that these authentic tasks should come from professional practice and that constructive learning is stimulated by authentic learning situations that demand problem-solving skills (de Bruijn & Leeman, 2011). Both de Bruijn and Leeman (2011) and Fuller and Unwin (2003) point out the importance of the learning environment, as it has a decisive influence on the design of effective learning processes, and is thus included in the analysis (see 4.5). The analytical framework will therefore include the categories 4.1 Role of the teacher; 4.2 Role of the learner from the teachers' perspective; 4.3 Teacher´s beliefs and self-image; 4.4 Forms and methods of learning as well as the 4.5 Learning environment.

Sampling and Methods

Face to face interviews with teachers, and live observations of the teachers' lessons were conducted and recorded. A total of 25 teacher interviews and 25 observations, were conducted at three different locations in the North (Delhi), South (Coimbatore) and West (Mumbai) of India, in order to reflect a differentiated picture of teaching at ITIs. Since this work is an explorative analysis of teaching from the perspective of teachers at Indian ITIs, no nationwide total survey was intended. Accordingly, the field of inquiry is limited to three sites (plus preliminary study in the north-east).

Considerations at the preliminary stage resulted in a selection of major-cities which, due to their geographic location as well as their structural conditions allow at least a partial consideration of the various contextual conditions of different regions in India. The regional distribution of the data collection is intended to reflect a differentiated picture of teaching at ITIs despite its limitations. However, the survey only took place in urban centres with comparatively good infrastructure, meaning

that, direct extrapolation to ITIs in rural areas cannot be assumed. Although the locations considered in the main study are all large urban centres in India, there are major disparities between the locations in terms of language (Hindi Tamil, Marathi), regional identity, ethnic composition of the population, and the shape of the local economy. These differences, however, are reflected in the entire Indian society, which is why a consideration of the different places is regarded as reasonable.

Two schools were visited per site where the survey took place. A preliminary study was carried out in the north-east of India to test the design of the data collection. The north-eastern state of Meghalaya with its central city of Shillong was selected because there is a support network of researchers and the research topic is also recognized and promoted by the local education authorities. Contact with the schools was established through the local cooperation partners at Universities.

The target group of the study was teachers who teach technical subjects. In selecting the interview partners, the following points were taken into account: consideration of teachers in technical training occupations; consideration of heterogeneity with regard to length of employment; consideration of heterogeneity with regard to gender affiliation. The selection criteria of the training occupations are derived from two conditions: occupations within the occupational fields that are particularly strong in terms of training; occupations from craft and industry (as also subdivided by DGET). In total, teachers from ten different training occupations were surveyed, including Mechanic Motor Vehicle, Electrician, Fitter, Turner, Welder, Mechanic Refrigeration, Mechanic machine tool maintenance, Mechanic Auto Electrician, Electronic Mechanic, Draughtsman Mechanic).

Interview guidelines include categories on the teachers' personal educational background and their professional qualifications; in addition, their previous teaching experience and principles are addressed, as well as their own conception of the role of the teacher in the classroom, and learning approaches, learning strategies and methods. The interview guidelines were developed on the basis of a selection of theories on teaching and learning, including student-centred learning (see in detail the analysis section below). The interviewees were selected by the head teacher of the respective ITI, and the guided interview was conducted at the premises of the respective school. The teachers' statements were anonymized so that no conclusions can be drawn about the individuals, although the headteachers know the identity of the interviewees through their pre-selection. However, a comparison of the teachers' statements by the headteacher did not take place. The interview was recorded in its entirety; the duration of an interview varied between 24 and 46 min, depending on the participant and with or without translation into English, the average being 33 min. The interviews were fully transcribed and anonymized. The transcriptions and content analysis were carried out according to Kuckartz (2014). The research data was stored and archived in a data-protection-safe manner.

After each interview, the identification number of the teacher interviewed was noted, and an appointment was made to observe the teaching of the previously interviewed teacher. Classroom observations were carried out in order to check, substantiate and reinforce the content of the statements (de Bruijn & Leeman, 2011). This is done to minimize the cultural bias that can occur when interviewed are carried out by international research groups (Jambo & Pilz, 2017). Furthermore, the

observations can provide an even deeper insight into actual teaching behaviour (Guo & Pilz, 2020; Hilberg et al., 2004). The observation focused in particular on the following elements to assess how instruction is structured in Indian ITIs: Role and attitude of the teacher during the lesson; interaction between students and teachers; forms and methods of learning; physical aspects and infrastructure of the classroom; learning activities; the teaching methods and the media used in the lessons. These elements are based on the analytical framework (see 3.1.) referring to the approaches of Fuller and Unwin regarding a comprehensive approach to learning and to de Bruijn and Leman and their reflections on powerful learning environments. For the observation, a proven and tested instrument was used which deals with the same topics (Guo & Pilz, 2020). The instrument was adapted and adjusted to the present context and the analytical framework. All observation elements were detected and documented in an observation sheet. The duration of the 25 lessons observed was between 30 and 60 min due to unforeseen interruptions. Observations were conducted by only one researcher to ensure minimal impact on the instructional process. For the observations mainly school lessons were selected which were held in English, for observations of lessons in Marathi, Hindi or Tamil the help of translators was resorted to in order to be able to capture the content components and to avoid that side effects are lost. All observation results were individually compared with the teachers' interview outcomes, and also analysed in an aggregated format.

Results and Discussion

The results of the data collection from the ITIs in Delhi, Coimbatore and Mumbai are presented below. These are composed of the interviews with the teachers, and the observations, which can be used to supplement the interviews. The following section presents particularly powerful quotes from teachers that are typical of the research data and reflect individual aspects of the data as a whole. The categories of the evaluation, are based on the research questions, and refer to the theoretical background including the analytical framework, with the concepts of Fuller and Unwin (2003) and de Bruijn and Leeman (2011).

Role of the Teacher

The interviews and observations show that the teacher has an active role in teaching in the observed ITIs, and directs and controls the instruction process:

"He [the teacher] wants to give his 100% through his eyes, through his voice, through his board, through his knowledge." TD9.

The teacher is at the centre of the lesson, and learners are visually focused on the teacher. The voice, the appearance and the teacher's personality are of great importance, due to the strong centring of the lesson on the person of the teacher:

"I am active in classes. Means first I maintain peace in each and every class. I write on board. I go to this board and pick the chalk and any topic given to me I will teach them directly by writing on this board (…)." TD10.

The content of the lesson is reproduced by the teacher, and captured through media such as the blackboard. Apart from oral processing and written recording by the teacher, there is usually no further participation by the students, as was made clear through the observations. This is even the case when practical elements are to be taught:

"[…] he [the teacher] told that suppose this is the machine then he will take the machine to classroom and he will open it and he again assembled it and like that he will give the knowledge to students." TM4.

The steps in the practical exercise are taken by the teacher, while the students adopt a passive and observing attitude. There is no active participation and independent involvement of the pupils:

"So, his learning approach is motivational approach in nature. So, he [the teacher] teaches and tries to bring out their talent by telling them what to do." TC7.

There is a strong imbalance of competence and power between the actors involved. The teacher is the mediator who prescribes the content to the learners, which clarifies the active-passive construction of the transfer of the content. There is no provision for a critical appraisal of the content, or for the students to construct their own knowledge. The observations show, that the students are merely recalling content taught by the teacher, by being asked to repeat it aloud. In this form of teaching, the teacher often also takes on the role of motivator, but also preserver of discipline. The teacher is perceived as the authority; a role which he also uses and enforces. Along with imparting knowledge, skills and competencies, this is often seen as the main task of the teacher.

As illustrated, in the student-centred approach, students should be at the centre of the learning process, while the teacher plays the role of a coach or facilitator who promotes self-directed learning (Tam, 2000). The interviews and observations make it clear that this is not implemented in the ITIs under consideration; in fact, the exact opposite prevails, as the teacher takes a central and dominant role in the teaching process. This form of lecture is only supplemented by the interspersion of questions or the development of a student-teacher discussion. The strong position of the teacher consequently pushes the students into a passive position; thus, no critical questioning is promoted or encouraged, and own construction of knowledge and skills are non-existent. Competencies, except for the subject-specific one, are not developed or encouraged, so that the subject-specific knowledge remains static and isolated. Due to the strong focus on the teacher, his or her individual characteristics such as the teacher's personality, the teacher's self-motivation and professional competence and knowledge, have a considerable impact on teaching and learning. Thus, the implementation of the teacher's role as a central factor in the teaching and learning process, is strongly related to beliefs and self-image (see 4.3), and the limited

knowledge about alternative methods and possibilities of teaching implementation (see 4.4). In terms of Fuller and Unwin's approach, this is considered a restrictive type of teacher role.

Role of the Learner from the Teachers' Perspective

The role of the teacher and the learner influence each other within the context of the teaching action, and are thus interdependent. Therefore, the role of the learner, from the teachers' perspective, has to be seen against this background, and in contrast to, the role of the teacher:

> "Precision is important for a learner they should try to grasp whatever the professor says, they should listen to the teacher and try to grasp whatever he/she says." C7.

Due to the strong focus on the teacher in ITI, the students take on a passive role, whereby they are predominantly required simply to be receptive. From the teachers' perspective, the students are recipients of knowledge and therefore passive learners:

> "First of all is motivation, he [the student] must be motivated, he must grasp knowledge and then discipline. He must be disciplined, must come on time, and must be in proper uniform, well behaved, healthy." D3.

The teachers' expectations of the students are shaped accordingly, and relate in particular to discipline and behaviour, rather than to qualities such as their self-involvement or ability to work in groups or with partners. In addition, the unreflective copying of the blackboard picture, and the taking of notes, is regarded as the student's central task. Application, interrelationships and practical use of the taught content, are not discussed further:

> "Actually, it's like if the learner is willing to learn something he should focus on the teacher's speech or voice whatever he says. If he keeps his ear to that teacher, he can do well. He can learn." TD4.

From the teachers' perspective, the most important factor in ITI's lessons, is passive and attentive listening by the learners; dialogue or discussion with the teacher or classmates is rarely encouraged, and the only factor for learning success is often defined by the teacher as the student's motivation and willingness to learn.

It became clear from the interviews and from the observations, that the role of the teacher has a direct influence on the behaviour of the students, and that centrality of the teacher places students in a passive role in ITIs. The pupils are dependent on the teacher both in terms of method, and in terms of content. Due to the lack of prior knowledge and competencies, and the lack of support for independent knowledge acquisition, the ability to reflect and criticize as well as to deal with the subject matter, is severely limited. Participants are not encouraged to take responsibility for, and reflect on, their own learning. Furthermore, they have no opportunities to reflect on their own learning progress. The teaching shows no sign that the students themselves could control the transfer of knowledge and actively shape the learning

process. The individual learner's personality is not addressed, so there is no construction of their own understanding of concepts in relation to their prior knowledge and individual experiences. The very pronounced passivity of the students, which is related to the teacher-centredness, prevents a more action-orientated transfer, and can be seen as a major reason why students do not acquire employable skills at ITIs. Especially with regard to the aspects of construction and reflection in the sense of De Bruijn and Leeman's approach, our data show at first that a powerful learning environment cannot be assumed with regard to the learning role.

Teacher´s Beliefs and self-image

To understand how the process of teaching takes place in Indian ITIs, it is essential to look at the beliefs of the teachers (Brinkmann, 2019), which mainly became evident through the interviews:

> "[…] from my point of view writing on the board or writing in the notebooks is the best method how to teach the student. […] some students are having their [own] memories which are not sharp enough." TD2.

Great importance is attached to teacher-centred methods. In order to impart the educational content, it must be brought to the student by the teacher or the textbook. The students' own construction of skills, competencies and knowledge development plays no role. This is justified by the supposedly low performance of the learners:

> "Maximum content knowledge should be known by the student to pass the exam." TM6.

The teacher places great emphasis on the theoretical content of the syllabus, and sees it as his main task to cover this; thus, the exclusive focus on the subject content of the specific area becomes clear. De Bruijn and Leeman in particular, however, point out the importance of situational and practical learning situations as opposed to pure theory-based knowledge transfer. An orientation to professional practice and the reference to the future professional working sphere of the students is not the focus:

> "Yes they have to pass it [the exam] is very important then only they get placement and all." TC6.

Due to the significance of exams, these take the spotlight; thus, performance in exams is seen as an important factor in measuring learning success. Good performance in exams alone leads to the possibility of getting lucrative, high-status jobs, while other contents, that and are not tested in the exams, are accordingly neglected:

> "I don't have that much of experience […]. I have sit with other seniors […], I just observed how they teach and how they tackle the students. Because from the starting time it was quite difficult for me to adjust with the all the students but when I sit with my seniors and [observe] how they teach, how they tackle the students, I learn" TD1.

A preference to stick to the traditions can also be observed in the presentation of lessons. The teachers take their older superiors as role models, whereby old-established and supposedly proven methods and behaviours are passed on and handed down without, however, reflecting on their usefulness and efficiency.

The teacher's belief and self-image are an important aspect in determining whether student-centred learning can be implemented (Brinkmann, 2019). In the Indian ITIs in the examined areas, as revealed by the interviews and observations, it is clear that the teachers' preferences are not conducive to student-centred learning. Brinkmann (2015) discusses various factors that influence teachers' pedagogical beliefs, and thus the structure of their lessons. The personal experiences of the teachers must be addressed. like the professional training of teachers (Ajithkumar, 2016; Pilz & Gengaiah, 2019; Pilz et al., 2022). If teacher education does not include concepts of how student-centred and action-orientated learning is structured, and what advantages it promises, then the foundational knowledge and practical skills to apply it in the classroom will be lacking. Due to the lack of balanced pedagogical-didactic training, the young teachers orientate themselves towards older colleagues. However, since the older colleagues themselves teach mainly in a traditional theory-based and teacher-centred way, the young teachers lack innovative role models. In addition, the educational (see 4.5.) and the socio-cultural context, with societal norms and cultural characteristics (see 5), have a strong influence on the teachers and thus on the shaping of classroom action.

Forms and Methods of Learning

The variety of methods and forms of learning can be found in Indian ITIs in Delhi, Coimbatore and Mumbai in a limited way, which is made clear by the teachers' statements, and is equally directly reflected in the observations:

> "All students can't be active all have different minds and so that's the main problem, we are trying to give them knowledge on the boards on the notebooks so that they can revive it again and again and again, the written knowledge." TD2.

The major form and method is frontal teaching, with the blackboard as the medium; the student's action is to copy the blackboard picture and take notes. This is complemented by questions from the teacher and the development of a teacher-student conversation. To a lesser extent, practical examples are given by demonstrating, for example, electrical circuits and switching systems. However, here too the students take a passive role and observe the teacher handling the practical objects. The same applies to the display of tools.

> "Yes, it always active and we giving them a lot of learning methods like black board and all others, like power points. We use both the methods for giving the knowledge to the students." TD3.

As a variation to frontal teaching, often only a change of media is offered, while the method remains the same. Due to the mostly very limited equipment, however, the variation of the media also takes place only to a very limited extent:

> "Deductive learning because you need to know the theory before you go into practice right, you need to have the theory first so deductive." TC7.

Often the deductive learning approach is preferred by teachers. The content information flow of the deductive method moves from general to specific and focuses more on the teacher, which in turn indicates a teacher-centred approach.

Although the importance of the practical components is repeatedly mentioned in the interviews, this is not reflected in the observations. In addition, the practical components mentioned only relate very vaguely to later professional situations.

The forms and methods give a good insight into how learning is implemented in practice. Static and less flexible forms of teaching, little variety of methods, and the limited use of different media, make it clear that a less student-centred approach is being followed. In the student-centred approach, ideally students should independently develop meaningful, flexible knowledge and skills required for competent professional behaviour (Sturing et al., 2011).

The transmission of static knowledge with a passive student role, giving no opportunity to construct knowledge and competencies independently, where no exchange with fellow students is encouraged and no reflection and evaluation of the state of knowledge takes place, has a significant influence on the lack of employability and practical competence of the students. The methods of student-centred instructional design such as discussions, group work or case studies, which are typical of Hativa (2000), are not in the teachers' repertoire of methods, and are consequently not used in the ITIs. Furthermore, the courses provide little room for cooperative learning, and exchange between students is hardly promoted or initiated. The construction of authentic learning situations (Sturing et al., 2011) is also largely missing, as often only the theoretical elements (such as formulas) are regarded as important, but the application in realistic contexts, and practical use in professional practice, are not considered. Due to the absence of complex, problem-orientated learning situations, the content taught at ITIs seems to be static, inert and not application-orientated. However, it is precisely these elements that De Bruijn and Leeman as well as Fuller and Unwin consider to be important in order to be able to implement action-oriented vocational education.

Learning Environment

The environment in which teachers operate influences their practice of teaching (Brinkmann, 2019). Aspects such as low pupil-teacher ratio, or adequate space and equipment, as well as solid infrastructure, can positively influence or enable the implementation of student-centred learning:

> "[.] working environment I was feeling active because environment of our college is quite good, they will provide quite good classes, neat and clean classes in which you get to know like, get motivate to teach a student." TD1.

In the general discussion of Indian vocational education and training, the inadequate infrastructure and obsolete equipment are often mentioned. The training infrastructure is in many cases not geared to meet requirements (Tilak, 2018). However, in this study, the teachers are satisfied with the equipment and infrastructure in the ITIs, as their statements show. However, they often have relatively low expectations, for example, basic cleanliness is already perceived as a positive aspect. Overall, the learning environment and infrastructure in the ITIs is in line with a teacher-centred form of instruction, and is consistent with the aspects discussed earlier such as the role of the teacher and the methods of learning. The room structure is centred on the teacher giving the instructions; it is static, mostly with fixed chairs, which severely limits the possibilities for group work or alternative room layouts. The arrangement of the room symbolizes teacher-centeredness, and makes it clear that there is no provision for exchange between pupils. Collaborative processing, construction or reflection is not guided by the use of media. Workshops are available for practical learning, but they are often poorly equipped. Teachers use wall posters to illustrate theoretical relationships or to visualize formulas. If original parts such as circuits, light bulbs, tools or models of machines are available, they are normally used exclusively by the teacher. The pupils will often repeat activities demonstrated by the teacher, but without a specific problem or practical and realistic activities being associated with them. The observations show, that the pupil-teacher-ratio is between 15 and 35 pupils per class, and therefore quite suitable for methods such as group work, which would enable an exchange among the pupils and an independent construction of knowledge, skills and competencies. However, these possibilities are not taken advantage of: the learning environment in the ITIs makes it explicitly clear that the infrastructure is not designed for student-centred learning, which is in line with the results from the other categories considered and other findings (Ramasamy et al., 2021; Tara et al., 2016). The results described in "Results and Discussion" section relate strongly to the observed ITIs in Delhi, Coimbatore and Mumbai. Nevertheless, despite the comparatively small sample, these results also provide implications for the overall VET sector in India. These implications for India and the international context are discussed in the following section.

Conclusion

The numerous advantages of student-centred learning in the field of vocational education and training, have been intensively discussed (de Bruijn & Leeman, 2011; Mulder, 2017). However, critical reflection is also necessary, because findings also show that student-centred learning does not always automatically lead to better learning outcomes for students (see e.g., Vermunt & Verloop 1999). For example, a meta-study of student-centred learning, specifically in German VET, did not find sufficient evidence of generally better learning, and these findings did not only refer to the teaching of subject-specific competencies but also to others (Nickolaus, 2000).

Another critical strand of discussion must also be outlined here: it must be stated that this is a model that originates from the Western cultural sphere (Joy & Kolb, 2009). The adoption of such concepts as policy borrowing in other contexts,

is only possible if local conditions are taken into account (Steiner-Khamsi, 2014). Thus, the socio-cultural context has a decisive influence on whether the transfer of concepts, such as student-centred learning, can succeed. Aspects such as religion, political system, or world views differ significantly in different countries, and accordingly influence whether cooperative concepts that require an open learning atmosphere, can be implemented. For example, Schweisfurth (2011) reviews a variety of studies of learner-centred education implementation that suggest that cultures which tend towards "high power distance" or "collectivism", tend to find it difficult to implement aspects of learner-centred pedagogy such as democratic teacher-student relationships, or focus on individual learners' interests. The hierarchical society and view of Indian society, promotes authoritarian, hierarchical and teacher-centred teaching (Schweisfurth, 2013). In this context, Brinkmann (2019) likewise concludes: "The high disjuncture between the ideals of LCE (learner centred education) and the physical constraints of many classrooms in the developing world has led several authors to suggest that perhaps LCE is simply an unrealistic policy option that may be feasible for high-resource classrooms in the West but not for the global South."

For India specifically, it should be questioned how students in vocational education, who have previously only known teacher-centred learning for years in general education, deal with student-centred learning, or react to it. In this context, it should not be ignored that pupils, in the domestic environment, are also strongly socialized culturally with regard to obedience, and the experience that manual or practical work tends to be regarded as inferior in contrast to white colour work (Ajithkumar & Pilz, 2019). Furthermore, in the context of VET, the needs of employers must also be taken into account. Findings indicate that employers are not satisfied with the quality of ITI graduates; however, this criticism primarily refers to basic knowledge (reading, writing, literacy) as well as subject knowledge, punctuality and discipline (Ajithkumar & Pilz, 2019). Detailed empirical studies conducted among employers, however, document less of a need for complex skills such as in-depth application knowledge, independence and problem-solving skills for ITI graduates, as they are often only employed for simple, supervised and largely tailorized work processes in industry (Neroorkar & Gopinath, 2020; Pilz, 2016).

If, however, changes are to be made in Indian VET, in the sense of the modernisation discussions outlined in the introduction, there are two approaches in particular that are repeatedly discussed internationally:

On the one hand, modern curricula could be developed that adequately reflect student-centred learning, and serve as a guideline and basis both for teaching and for the subsequent examinations. As an example, reference can be made to China, where comprehensive competence-orientated curricula have been implemented in recent years (Chen et al., 2021). With the introduction of the learning field approach, Germany has also embarked on the basis for more LC teaching by means of orientation to work processes and the solution of complex practical problems. At the same time, the examinations were thus also more specifically orientated towards professional reality, and no longer exclusively focused on subject knowledge replication (Pilz & Fürstenau, 2019).

On the other hand, the present study also makes clear that adaptations in teacher education can be a particularly important influencing factor in initiating changes. The study shows that teachers in the Indian system predominantly rely on traditional learning concepts, with a strong theory-based and teacher-centred approach. It can be assumed that many teachers have very limited previous pedagogical-didactic experience, and that innovative methods such as problem-orientated and student-centred methods, are not yet part of their experience (Dyer et al., 2004; Pilz & Gengaiah, 2019; Pilz et al., 2022). Due to the lack of pedagogical training and limited practical experience in the pedagogical field, teachers draw on their own experiences from their personal school life (Oser et al., 2006).

> "Previously I never teach to anybody but here I have the opportunity. In the paper I read this and I join this [ITI]. I never before in my school days I never say a single word in my whole life in front of a class, but here I can." TM7.

The lack of knowledge about didactical concepts, becomes clear through the significant discrepancy between own perception from the interviews, and the reality assessed through the observations. Basic didactic concepts, contexts or methods are not known and thus cannot be sufficiently reflected, articulated and evaluated. Brinkmann (2016) clearly shows that the concepts (and their benefits), must first be brought into the teachers' area of experience in order to influence their beliefs; therefore, new forms of teacher training could be a promising starting point in initiating change. The political will to amend this is present, at least in India, which represents the first step towards implementation in the VET sector (MHRD, 2019, p. 134). The more it is possible to induce a change in teaching concepts, the easier it will be to achieve the "shift from teaching to learning" on an individual basis. However, unless the other conditions are also favourable for student-centred learning (such as class size, examination system, textbooks, school head), implementation will only be successful to a limited extent (Brinkmann, 2016).

It should also be noted that colonial rule has had a profound impact on the Indian educational landscape. The effects of colonial rule are also present in vocational education. This has resulted in the structure of the education system being focused on academic education, with less attention paid to vocational education (Singh, 2001). It can be stated that general education has a better status in society than VET, which is underlined by empirical findings. An explanation could be drawn onto India's historical development, in which only the higher castes had access to general education (Bayly, 1999). The way VET is perceived depends on the individual's environment, which is influenced by religious affiliations, historical as well as cultural influences such as India's caste system. Given the sensitive colonial history, care must be taken not to merely replace old approaches with new international approaches without paying attention to local conditions and needs (Ramasamy et al., 2021). Here, the Indian government in particular must proceed with caution, as many approaches introduced in the past were not sustainable and the will to invest in TVET was not strong enough (Schneider & Pilz, 2019).

The lack of knowledge of didactic concepts of the ITI-teachers, only became apparent through the combined survey method via interviews and observations, which is why this survey method proved to be successful in determining the teaching

methods and teacher's beliefs. Of course, cultural bias cannot be excluded in a complex intercultural survey, conducted by an international team of researchers. Another limitation is the small sample size of the study, and an extension of the sample to other ITIs is recommended, as well as the consideration of other school types in the Indian VET sector, in particular Polytechnics, in order to check whether the findings are mirrored in other school types, or even higher education programmes (Schneider & Pilz, 2019). In addition, it would be of interest to examine the processes of the transfer of skills, competencies and abilities from the students' perspective, in order to determine how they perceive teaching at the ITIs, and to be able to reflect the findings of the present study. In addition, the student-centered approach could be examined in pilot studies to see if it can help to make the education system in India more inclusive in terms of gender, class, and castes (Badge et al., 2016).

Declarations

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