A NEW EDUCATION PATHWAY FOR MARGINALIZED YOUTH IN THE US: A MODEL FOR DENMARK AND SCANDINAVIA? REFLECTIONS BASED ON THE APPROACH OF THE P-TECH SCHOOLS

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Abstract: *Denmark has persistent challenges with an unacceptably large 'residual group' of young people with no upper secondary education. Vocational education and training programs continue to suffer low enrollment and high dropout rates. Far too many ethnic minority boys drop out of school and educational system in Denmark. At the same time, there is a growing shortage of labor within science, technology, engineering, and mathematics (STEM). In this article, we introduce and discuss an educational approach, invented in the Pathway-to-Technology (P-Tech) schools in the US, as a reflection model for Denmark and Scandinavia and for teacher educators. P-Tech is the concerted pedagogical efforts of various educational institutions, businesses, and political initiatives aimed specifically at the large marginalized and vulnerable residual youth groups in the US.*

Keywords: P-Tech, disadvantaged students, new approaches to education and marginalization, education and socioeconomics

Introduction: The Residual Group Challenge in Denmark, Europe and the US

Dropout rates and non-completion of upper secondary education – in Denmark often referred to as the "residual group challenge" – have long been familiar and discussed issues in Denmark, Europe, and the US. In 2015, the statistical office of the European Union, Eurostat, published statistics on all 28 Member States showing that in spite of a general decrease over the past ten years, 16% of all young Europeans aged 16-24 had not completed post-secondary education (Eurostat, 2015). The figure for Denmark was 10%. However, there are large variations behind this figure regarding gender: the percentage of young men in 2015 who had not completed an upper secondary education in Denmark was considerably higher than for young women.

Eurostat (2015) pointed to risks associated with dropout rates and failure to complete a secondary school education program. These risks included increased unemployment, poverty, and social exclusion. According to Eurostat, almost 60% of the European population aged 18-24 "with at most lower secondary education and who were not in further education or training were either unemployed or inactive in 2015" (Eurostat, 2015, n.p). Not being enrolled on an upper secondary education program, therefore, leads to marginalization and inactivity. This trend was confirmed by a 2016 survey from the Danish Economic Council of the Labor Movement (Arbejderbevægelsens Erhvervsråd, 2016), which showed an increase in the size of the group of young people who drop out of the formal education system in Denmark. In 2017, following the recommendations of an expert group a new, major engineering initiative "Engineering in School" was launched in the Danish primary and lower secondary school system (Danish Ministry of Education, 2017; Engineer the future.dk, 2017). At the same time, other surveys showed that many STEM talents (science, technology, engineering, and mathematics) get lost in the Danish education system (Andersen, 2015). Furthermore, still other surveys indicated an increasing shortage of skills within precisely

these disciplines in Danish society. Forecasts have shown that in a few years Denmark will be short of 13,500 highly qualified graduates and 44,000 skilled workers within the STEM areas (Danish Industries [DI], 2016).

Just as in Europe and Denmark in the US there has been much focus in recent years on the residual group of young people who either leave the educational system and/or do not complete a secondary education. Like the 2015 Eurostat survey, a 2014 survey from the American National Centre for Education Statistics (NCES, 2016) showed that the status dropout rate continued to be significantly higher in 2014 for young African-Americans and Hispanics relative to young white Americans. Status dropout rate is defined as "the percentage of 16-to-24-year-olds (…) who are not enrolled in school and have not earned a high school credential" (NCES, 2016, para. 1). In 2016, the NCES states, "in 2014 the Hispanic status dropout rate (10.6 percent) remained higher than the White (5.2 percent) and Black (7.4 percent) status dropout rates" (p. 1).

According to the *NCES* (2016), in addition to ethnic differences, these are often youths with low socioeconomic status. The American researcher Reardon (2011) demonstrated an increase in what is referred to internationally as 'the academic achievement gap' between the rich and poor in the US. In Scandinavia (i.e. in Norway and Denmark respectively), Kristiansen (2012) and Jensen (2016) have similarly identified a correlation between the socioeconomic status of children and their (lack of) opportunities with regard to educational attainment, health, and general living conditions. In the US as well as in Europe, this gap results in marginalization, low or no attachment to the labor market, isolation, etc., which can ultimately lead to violent behavior (Eurostat, 2015; NCES, 2016). Therefore, in recent years, backed amongst others by former President Obama, there has been strong focus on establishing new, crosscutting educational initiatives in the US to address this issue. One of these initiatives is the so-called Pathway to Technology (P-Tech) schools (Barrett, Maclutsky & Wagonlander, 2015). In 2017, there were over 50 P-Tech schools throughout the US (Ptech.org 2017).

Could these schools serve as inspiration for the Danish and Scandinavian school system? Could their pedagogical values and didactical thinking inspire the teacher training programs of these countries? We think the answers to these questions could be positive.

In the fall 2016, the authors of this paper went on a study trip to the United States to learn more about the P-Tech schools and to examine the underlying pedagogical principles behind them (Andersen, 2015; Petersen, 2018).

The Objective of This Paper

Apparently, the P-Tech schools in the US have successfully addressed the residual group problem and have re-integrated youths from the most vulnerable areas in the US by creating a new type of school. But how? On the website we find this description:

> P-TECH 9-14 are public schools that offer students a new approach to learning, bringing together the best elements of high school, college, and career. (Ptech.org, 2017, homepage).

To clarify this description, P-Tech schools use the term 9-14; normally, the abbreviation K-12 is used in the American education system. This term includes schoolchildren from kindergarten to 12th grade. This corresponds to the European preschool class to the 3rd year of upper secondary school/vocational education and training programs and higher technical examination.

In a Danish and Scandinavian context, it is interesting that, contrary to the familiar European perception of the American school system and its focus on tests, P-Tech schools

have introduced a distinctly project-oriented and learner-centered approach. On one hand, the schools put high academic, social, and personal demands on students, and on the other hand, take considerable account of their individual and often very vulnerable prerequisites and situations.

Based on a brief introduction to European theory of "didactics", pedagogy, and pedagogical models, the objective of this paper is to introduce and discuss the so-called P-Tech school model. We have worked on a two-fold problem statement in our case studies and in this paper:

a. What is the content of the pedagogical model used by the P-Tech schools?
b. What is the purpose of the P-Tech schools regarding the residual group problem?

Based on our findings we will outline how teacher education and teacher educators might adopt and address these issues.

Research Methodology

The authors conducted two weeks of classroom observation in 12 different classes and talked with students, teachers, and heads of school in two P-Tech schools: one in Newburgh, New York and the other in Chicago. The research method comprised participant observation, combined with semi-structured interviews with 19 students, eight heads of school, and five consultants (Kristiansen & Krogstrup, 2005). To aid in the consistency of observable data between the researchers, the authors in advance had developed a research guide for the observations that both researchers would use. Similarly, the researchers had prepared an interview guide, which both researchers used for interviews. Observations and interviews during the first days were conducted by both researchers and compared (Kristiansen & Krogstrup, 2005; Kvale & Brinkmann, 2009). According to Kristiansen & Krogstrup (2005), observations are about observing people in their natural environment - in this case students, teachers, and heads of school at the P-Tech schools visited. The observations helped provide insight into the life and different social contexts and situations that play out in and around these schools. Furthermore, the authors also had access to data of a non-verbal nature (Kristiansen & Krogstrup, 2005). The interviews with students, teachers, and heads of school were structured as semi-structured, informal interviews conducted on the basis of the interview guide prepared by the researchers. The interviews provided more insight into the lived experiences of the respondents (Kvale & Brinkmann, 2009). The combination of observations and interviews was chosen to obtain more complex data material and to have the opportunity to ask elaborative questions about the thoughts, motives, and sentiments of students, teachers, consultants, and heads of school.

In addition, the authors conducted a systematic search for material on P-Tech schools. The search identified many informative articles, course catalogues, websites, and research papers (An, 2013; Barnett, Kim, Zander, & Avilo, 2013; Barrett et al., 2015) to which references are made in this paper.

First, we will introduce the theoretical background of didactics, pedagogical models, and the pedagogical concept of engineering. This concept originates largely from the US, but has found its way to Denmark and Scandinavia in recent years (University College Via [UC VIA], 2017). Second, we will introduce the P-Tech schools, and the pedagogic approaches that characterize these schools, and finally, we will discuss the relevance in a Danish and Scandinavian context and for teacher educators.

Pedagogical Reflections and Engineering Learning as a Pedagogical Model

Historically, the theoretical field of teaching, learning, and education – in a European context

sometimes entitled as the theory of didactics – has developed various pedagogical models (Qvortrup & Wiberg, 2013). In a Scandinavian historical context, the pedagogical models by Jank and Meyer (2010) and Hiim and Hippe (2010) have been influential. Moreover, the German educational philosopher, Klafki's (2001) theories played an important role in a Danish pedagogical context in the 1970s and into the first decade of the 21st century (Rahbek Schou, 2013). The American philosopher of education John Dewey, known for his theory of 'learning by doing', has had a decisive influence on what the Danish researchers Keiding and Wiberg (2013) referred to as an action-oriented pedagogy, an approach that has also been influential in Scandinavia.

Thus, the European concept of didactics is often associated with wanting to achieve something with someone in an educational context (i.e. a concept of intention). However, who wants to achieve what and with whom? This is an extensively debated question: is focus on the concept of Bildung and on the development of the student or child as a whole person, or is focus primarily on curriculum and learning objectives? (Bengtsen & Qvortrup, 2013; Nepper Larsen, 2016). In other words, using Klafki's (2001) classical concepts are we talking about formal or material education theories? Advocates of the formal theories focus on the individual student and their overall development, while the representatives of material theories turn their attention to the object of the educational process (Klafki, 1983, quoted in Rahbek Schou, 2013, p. 317). Klafki suggested a synthesis of the two by introducing the notion of 'categorial' education as a main goal in all education including teacher education (Klafki, 2001).

In Europe the Dutch-British researcher and philosopher of education Biesta (2010) outlined his critical opinions regarding recent decades' tendency towards material education, focusing on tests, measurement, and accountability. Furthermore, in the US many researchers are criticizing the "teaching to the test" focus in American schools, claiming that this contributes to narrowing of the curriculum and to social inequality in American schools (Berliner, 2014; Berliner & Nichols, 2005; Reardon, 2011).

From an overall perspective, the concept of didactics as pedagogical reflections is a notion embracing the concepts of intention, values, and ideals. We agree with Bengtsen & Qvortrup (2013) that all pedagogical reflections and actions are supported by a certain vision, mission, ambition, goal, or objectives. Because of the problems with increasingly unequal access to educational opportunities, the residual group challenge, and their pedagogical approaches and actions, the P-Tech schools have endeavored to incorporate elements from the engineering learning model.

Engineering Learning

Engineering as a pedagogical learning concept is closely related to Dewey's theory of learning by doing and to action-oriented pedagogy (Keiding & Wiberg, 2013). It is an inductive, problem-based, and project-oriented approach addressing specific problems and questions through an innovative and technology-focused approach. In an international context, researchers and teachers have worked with this approach, which is also referred to as 'the engineering design process' for many years (Ertas & Jones, 1997; Kaiser, 2014; Tayal, 2013; TeachEngineering, 2017). Figure 1 illustrates the didactic circle and teaching approach in an engineering design process.

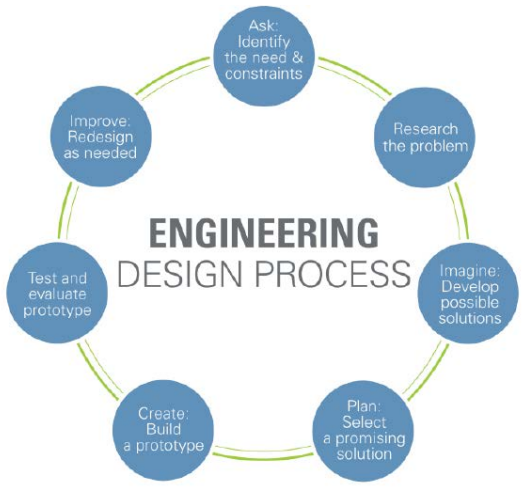

Figure 1. This figure shows the Engineering Design Process. © 2014 TeachEngineering.org. Used with permission.

The model illustrates various stages in the engineering learning process. In terms of the theoretical perspective, teaching starts by identifying problems and challenges, which students examine. The students develop and test ideas and hypotheses; they design and redesign specific solutions and prototypes, improve them, and develop further models. In collaboration, the students and teachers evaluate the work and refine any prototype. Tayal (2013) identified that teamwork and group processes in connection with creative development processes are crucial elements in the engineering design process, which he described as "The engineering design process is the set of steps that a designer takes to go from first, identifying a problem or need to, at the end, creating and developing a solution that solves the problem or meets the need" (Tayal, 2013, p. 2).

According to the American engineer and teaching expert Kaiser (2014), schoolchildren are brought up to think that there is only one correct answer. She proposed moving away from this approach, and instead, teaching them to consider all possibilities before choosing a solution. Schoolchildren need to be able to apply critical thinking, collaborate, and continuously assess their goals and challenges (Behrendt, 2015; Kaiser, 2014). Thus, Kaiser described what we could call a Bildung concept – and, in particular, what Klafki (2001) referred to as the synthesis of formal *and* material, namely the categorial education.

Findings and Discussion

P-Tech Newburgh

The first P-Tech school that we visited was in the city of Newburgh, 50 km north of New York City. It is a dismal area marred by high unemployment and crime rates. A few days before our arrival, two high school girls were murdered and several other young people wounded during shootings at a Halloween party. Our informants told that "Newburgh is famous for shootings" and "every other month someone is killed" and that such events are often related to drugs and crime.

The student body at the P-Tech school in Newburgh reflects the ethnic mix in the district, which is one of the most socially and economically disadvantaged in the state of New York. The population of the town comprises 50% Hispanics, 35% Blacks, and 15% Whites/Asian. The school has the same mix. The city is predominantly working class, but jobs in traditional industries have disappeared and unemployment is high. This is paradoxical, because there is a shortage of qualified labor within IT, management, accounting, and hi-tech. The many unemployed youths in the city, however, have no chance of getting these jobs, unless they first get a proper education. At the same time, there are young STEM talents who are not necessarily 'on the margins of society', but who are not being challenged and developed properly in the ordinary school system.

Pedagogical focus and approaches at P-Tech school. The city's new P-Tech school can play an important role in solving several of these issues. P-Tech schools are a groundbreaking pedagogical experiment stemming from

innovative thinking that breaks with the traditional division into distinct systems of primary and lower secondary school, upper secondary school, and post-secondary education. The combination of a number of coherent initiatives, which include social, socioeconomic and educational initiatives, characterizes the pedagogic basis at P-Tech schools.

Admissions criteria at P-Tech schools: Low socioeconomic status and break-out achievers. Students enter P-Tech schools directly from seventh grade not based on their grades and test results (if this were the case, many of them would never gain admission). Admission is based on applications, random selection, and a subsequent interview. We asked, "So, you don't accept the smartest kids?" and got the answer, "No, but those that we accept eventually become the smartest kids." Young people apply for admission to the school and get access to P-Tech primarily based on their (low) socioeconomic status. The student profiles in Newburgh are low socioeconomic status, Hispanics, African-Americans, and children of immigrants. Two girls in their third year, C. and L., confirmed that their grades were not the reason for them to get access to the Newburgh P-Tech school.

This means that for young people from marginalized areas, ethnic minority, and poverty backgrounds, etc., the P-Tech school is a chance to break out of their disadvantaged backgrounds. However, it is also a new chance for neglected STEM talents.

Dual enrollment. P-Tech schools offer 4-5-6-year programs, all of which are qualifying and involve so-called 'dual enrollment', i.e. the students are enrolled in high school and in college at the same time: the programs are a blend of lower secondary education, vocational, and/or upper secondary education and education at the bachelor's degree level. The students come from backgrounds where studying is not the norm and where neither parent has a college background. The idea behind P-Tech schools is to break out of the cycle of disadvantage, partly by introducing young people to college life while they are in high school, and partly by providing them with a college degree. When they have completed the program, they have a guarantee to get a job and a good pay (around USD 4,000 a month for a young person aged 18-20). Companies support the school(s), which are entirely public.

Project-oriented, student-centered learning, and mentors from private businesses. In line with the engineering design processes, the P-Tech schools do not focus on tests or grades, but rather on teamwork, and on teachers who follow the students closely over several years. Coaching (by teachers who have completed a relevant course), problem-based and project-oriented teaching, on-the-job-training and workplace visits, group work and mentoring are core elements in the approach. The mentors usually come from the workplaces where the students will be completing several long on-the-job-training placements. Students get a mentor from the beginning of their program.

The pedagogical principles at work at the P-Tech schools are a student-driven and project-driven approach to teaching. Teachers, students, and the head of the school in Newburgh confirmed this. Our observations of teaching also confirmed this. All students (e.g. in science class in second year) were seated in groups around tables engaged in completing practical and technical tasks relating to making specific lights turn on and off by using advanced computer software. We asked them what they were making. They said, "a light system." They seemed very absorbed and the teacher walked around offering to assist. Also in first year, all teaching takes place in groups. We observed a mathematics class. The students got assignments to complete together in the groups. The teacher followed along from a distance. The teacher

explained that she is more a facilitator of student activities than delivering a teacher-controlled teaching as is usual in many American schools. When asked about the differences to their previous school, the students said, “We work more together in groups. It is much more exciting. We have to find out things on our own.”

Time at school is spent on exercises, experiments, hands-on activities, projects, guidance, assignments, and discussions. Attendance is free of charge (i.e. financed publicly and by the business community) and all students receive free IT equipment. The students receive pay during on-the-job training periods.

Science, technology, engineering, mathematics (STEM) and other subjects. The series of subjects taught has considerable focus on technology and IT. For example, students learn to program, prepare accounts, establish cyber security and digital networks, as well as build robots and drones. However, they also learn subjects such as English, social science, and mathematics because the school is equivalent to the public school system. The students may either get a job in the companies and/or can transfer their education credits if they choose to return to college/university at a later stage. Thus, the P-Tech education program is a significant educational innovation.

As mentioned above, most of the students at P-Tech schools come from families characterized by crime, ill health, abuse, poor housing conditions, etc. As one of the students told us, “Boy, do my family have problems.” Two students from third year emphasized that, under the P-Tech concept, they have the chance to attend college without payment, and this is an entirely new concept in the American school system. “We go to college for free,” they told us, and none of their friends and acquaintances go to college. However, as mentioned, there is also another type of student: The neglected STEM talents who see an opportunity at P-Tech schools to develop their potential.

Personal development and life skills. The diverse personal development of the students is an additional pedagogy element at P-Tech schools. One might think that everything is geared toward technology; however, that is not the case. The schools place great emphasis on supporting students in their development as human beings including their development of important life skills. Life skills and social resilience are exactly what we focused on during our observations at the P-Tech school in South Side Chicago. This is an area known for its high crime rates and a high percentage of Afro-Americans and Hispanics.

P-Tech Chicago

Compared with the P-Tech school in Newburgh, which is relatively small with only 110 students, the P-Tech school in the southern part of Chicago has around 900 students. The buildings were built in 2012. The buildings are very unusual for the area as one of the young African-American students explained, “The school looks more like one of the high schools you'd find in the White part of the city.” The school has large, well-lit rooms, modern facilities, rooms for group work, general classrooms, and extensive technological equipment that the students can use in connection with classes.

The first person to approach us at the P-Tech school in Chicago was Mr. J. He is the school’s ‘all-round teacher’. He is the social worker, therapist, and guidance counselor, and he works full-time with the many problems faced by students. He went straight to the most important aspect of the school, “If you want to be successful with these students, you have to address their social-emotional problems straight away.”

The district and issues are the same as we saw in Newburgh but on a larger scale. Mr. J explained

how, in 2015, there were 3,000 murders in the city, and that the area has experienced a considerable increase in crime in recent years. According to Mr. J. this is linked to the no-tolerance policy of most other schools in South Side Chicago, which has resulted in extensive use of suspension as a sanction. "They are suspended even for not having tucked their shirt inside their pants," he said. "The whole 'we-won't-take-any-bullshit-from-you' approach has gotten out of control," he continued. Young people from challenged families therefore get the impression that the school does not want them, and as soon as they are sent out on the streets, the gangs stand ready to take over. "The schools don't want them; the gangs give them status, money, and success!" said Mr. J. He pointed directly to this as the reason for the growing numbers joining gangs, or as he puts it, "no school, no chance," and "crime is going up because schools are failing."

The P-Tech school in South Side Chicago, however, has an entirely different approach to these youths who attend the same classes as a number of STEM talents with whom we also spoke. These are young people whose parents are schoolteachers or hold good jobs further towards the center of Chicago. With regard to disciplinary problems with boys in particular, Mr. J pointed out the school's alternatives to suspension, namely consultation and to a certain degree detention. If a student is behaving badly in class, the teacher can send him to see Mr. J (detention) who will then talk with the student (consultation). He will try to understand the underlying problems and find solutions. Typically, the bad behavior is due to problems at home or bullying.

Another important tool is the mentoring scheme, under which all students at the school have a mentor throughout the 4-6 years they go to the school. Good relations between mentors and students are crucial, according to Mr. J, who counsels both teachers and mentors on the problems he discovers. However, Mr. J did not underestimate the problems that teachers may experience in the classroom. "Many of these boys can be extremely disruptive and explosive in the classrooms, so the detention option is necessary," he explained, stressing that he spends lot of time on detention. When they first sit with him in his office, he has a long talk with them and that seems to help. In contrast to other schools in South Side, most of the boys eventually settle down. Mr. J. told us "the families are unable to help these boys. The police and prisons cannot help them either. The school is the only solution," or more precisely, the P-Tech South Side School is the solution.

As in Newburgh, teaching at this school is project-oriented. Compared with the P-Tech school in Newburgh, we observed more classroom teaching in the South Side School. However, in most classes that we observed, there was also focus on project-oriented teaching, group work, and on students carrying out work independently. Relationships with the students are important, and as in Newburgh, the students have their mentor from various businesses with the addition of Mr. J.

Educational Approaches of P-Tech Schools

Overall, the pedagogical approaches of the P-Tech schools can therefore be described as comprehensive, action-oriented pedagogical approaches in an expanded engineering learning model that includes many known teaching approaches, such as project-oriented, student-centered, and learning-by-doing methods with a special focus on natural science subjects (STEM), and that by using Klafki's (2001) previously mentioned concepts, concentrate on both formal and material educational aspects. Although the schools have a strong focus on developing the students' academic skills in natural science subjects, we observed how the Newburgh school does not base admissions on grades and tests.

Regarding the residual group challenge, the P-Tech schools stand out because they focus not only on the residual groups, but also, socioeconomically and ethnically disadvantaged students as their target groups. The free access to the education programs and the combining of different levels of education in the same type of school (basic education with higher education i.e. in an American context: high school with the first years of college) are one of the tools. Another tool is the creation of networks that academically and socially scaffold each individual student. Mentors and social problem solvers are further tools. The students get a useful education on which they can build. The educational approach of the P-Tech schools places the disadvantaged youths at center stage.

Because the P-Tech schools are a relatively new type of school, future research and studies must demonstrate the degree to which it will be possible, eventually to include more young people from the residual groups in education and on-the-job-training programs that make sense.

Conclusion and Perspectives: Can P-Tech Inspire Schools in Denmark and Teacher Educators?

In this paper, we have introduced the pedagogical approach of the P-Tech schools. We have outlined how the P-Tech schools address the challenges regarding disadvantaged, low socioeconomic students, and the so-called residual group.

The engineering design process is an important pedagogical approach in what allows P-Tech schools to help solve the residual group challenge. However, the P-Tech schools have adjusted and added aspects of the model to launch the new school model. Firstly, the type of school created resembles an ordinary school in that it follows the curricula, etc. determined for the various classes/years/educational levels. Secondly, as something new, the P-Tech schools cut across known divisions in traditional education system, as we know them in the US and in Denmark. P-Tech schools have moved away from the traditional division between primary and lower secondary school, upper secondary school, and post-secondary education. Instead, P-Tech 7-14 schools combine into a single program lower and upper secondary education programs with the first years of post-secondary education programs. Students who complete this program earn a degree that is just slightly less than a full bachelor's degree and that will allow them to find skilled work. Thirdly, P-Tech schools are characterized by having particularly strong focus on IT, natural science subjects, etc. – the so-called STEM subjects – because the IT sector, among others, is expanding more than almost any other sector in the US and in the world. There is a clear understanding that this area will see an enormous need for qualified employees in the years to come and that there will be many new – and yet unknown – jobs to fill in the future. Fourthly, P-Tech schools have close links to the local community and local businesses including technology-based businesses. The businesses are actively involved in educating the young people (e.g. through mentor schemes, on-the-job-training programs, and in many cases, even job guarantees). Finally, P-Tech schools focus particularly on a project-oriented, hands-on, and student-centered personal approaches to their students. As described above, the students need close relationships with adults who can and will challenge them academically, socially, and as human beings. The P-Tech schools seem to have realized that if the intention of education is to develop independent, creative, and skilled young people, students must be treated with equity, to be taken seriously regarding their social and personal problems, and to be challenged with problem-based approaches so that they can contribute and develop new ideas.

The P-Tech schools have further developed the

problem-based and project-oriented approach to teaching, well known and applied for many years in Denmark and Scandinavia and have combined the approach with good framework conditions and relationships with important and academically skilled adults who are also working across traditional institutional borders. Maybe the P-Tech school model could be translated and adapted to a Danish and Scandinavian setting, and as it has in the US, establish good schools for the residual group and disadvantaged youths, while at the same time meeting society's needs for new jobs and new workplaces.

The P-Tech initiative is seen as a new, concrete, and much needed way of understanding aspects of "inclusion" in practice. New Scandinavian teacher education research points to increasing frustration with the top-down policy approach to inclusion that we have seen so far (Gidlund, 2018). The top-down approach describes the principles but not the solutions. At teacher training programs teacher- students are taught the principles of inclusion, indicating that teachers are supposed to include students with all kinds of difficulties and diagnoses in main stream classes without being directly pointed to concrete methods and didactics of how to do it. Up to 30% of newly educated Scandinavian teachers give up being teachers the first year of teaching practice after graduating, and the policy of inclusion is singled out as a major cause (Gidlund, 2018).

In fact, the P-Tech school approach has already inspired a Danish developmental project aimed at changing the teaching habits and learning environments of teacher training in Africa towards a more student-centered, project-oriented, hands-on approach. We have already published about the P-Tech schools in Danish (Andersen, 2015, 2017), and one of the authors is also involved in the Danish-African project. The research connected to the African project so far shows very positive results of the program (Andersen, Larsen, & Klange, 2018).

The importance of initiatives such as P-Tech should not be underestimated by teacher educators and schools. As we have mentioned, Klafki's (2001) ideas about a synthesis of formal *and* material education in the notion of categorial education previously have been widely used in Danish and Scandinavian teacher education, while the focus now is more material education – on testing and learning goals. For teacher educators internationally and in Scandinavia, P-Tech is a reminder that primary and lower secondary education and teacher education should embrace the whole student in the education process focusing on categorial education as a sound approach to students and learning.

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