

Article



Estimated Effects of Web-Based Course from Adult Vocational Students' Perspective—A PFA Course in Scandinavian Intellectual Disability Practice

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Abstract: In Scandinavia, the field of intellectual disability (ID) practice lacks specific course, professional training, theoretical foundation, guidelines, and practice consensus. However, Pedagogiskt Förhållnings-och Arbetsätt (PFA model) has the potential to offer a pedagogical attitude and a way of working within ID practice. PFA was developed in the context of Swedish ID practice and has attracted national and European interest. Most staff working in ID practice in Scandinavia are educated to upper secondary school (adolescent students) level or vocational course (adult students) level. In the present pilot study, we examined the effects of providing a web-based PFA course as a complement to the Swedish national curriculum. The aim of this pilot study was to assess the effects of self-assessed knowledge and learning using a web-based PFA course intervention on an adult vocational course. The study involved a quantitative intervention approach involving two equivalent groups in an experimental design: an experimental group (n = 12) and a comparison group (n = 46). These groups were administered a pre-test and a post-test questionnaire that estimated their knowledge of the course through self-reporting tests. The findings provide empirical evidence of the informed and sustained use of knowledge building through complementary web-based PFA courses.

Keywords: intellectual disability practice; intellectual disability guidelines; PFA; web course intervention; quantitative explorative design

1. Introduction

The Scandinavian field of intellectual disability (ID) practice lacks staff with specific course, professional training, theoretical foundations, and practice consensus. Few staff members have studied higher vocational courses, post-secondary courses, and university courses in social pedagogics. The staff engaged in ID practice play a pivotal role, but they are often left to devise strategies by themselves; receive minimal training or guidance on how to support individuals with ID; frequently provide support on their own or with co-workers, who are equally ill-prepared or inexperienced [1]. In the United Kingdom and Australia, active support appears to be the major work guiding staff in ID practice [2-6], also called person-centered active support [7]. However, to our knowledge, active support is not prevalent in Scandinavian countries. In Swedish ID practice, no major methods or guidance, except legal guidance, are applied. Different compensatory methods are used: for example, Alternative and Complementary Communication, naming different communication procedures and methods. It can consist of signs such as support, pictures, symbols, concrete objects, talking aids and computers. Other forms are manual or close-to-body communication, where natural reactions and body movements, such as sounds, facial expressions, signals and gestures are used and interpreted [8]. Cognitive support is a highlighted guidance. An obstructive environment means that the individual's implementation of activities and the opportunity for participation is limited. An environment that is facilitating can, on the other hand, improve an individual's activity



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Copyright: © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). performance and the opportunity to participate. Cognitive support can be seen as a compensatory environmental factor in daily life. The purpose is to facilitate the individual's opportunity for activity and participation and have an influence on decisions that affect their own life. There is often a need for broad cognitive support, where personal support from relatives or staff is an important part of the total support. Cognitive support in the form of pedagogically designed material and technical support constitutes other parts of cognitive support [9]. Three important parts to keep in mind are that it is about receiving information, processing information and being able to act [9]. More and more Swedish municipalities are exploring pedagogical attitude and way of work (PFA) as an approach in intellectual disability practice. In the Eskilstuna municipality in Sweden, experienced ID practice developers in collaboration with a researcher at Mälardalen University developed PFA, a knowledgebase to support persons with ID [10,11].

Traditional and online learning both have their advantages and disadvantages. Traditional face-to-face courses provide teachers with opportunities to have a more personal interaction with students, and students have the opportunity to learn with peers. Online courses, on other hand, provide more flexibility and autonomy in terms of time and location, but this could also be a disadvantage for some students. They can also face technical complications that hamper and slow down the teaching–learning procedure [12–14].

Online courses have become increasingly popular in recent years and have increased in prevalence during the current pandemic situation with COVID-19. The increased use of the Internet and increased expansion of high-speed connections have opened new opportunities for conducting online learning. The forms of distance course have also changed. Information and communication technology enables other means of communicating. Both teachers and students find themselves in the situation where they feel obliged to embrace the digital academic experience and online teaching-learning process [15]. In addition, other research has indicated the merits of online learning, and it is an important trend to consider. However, more research is needed to identify the pedagogical barriers and facilities between self-assessed knowledge and learning, and the different course delivery modalities.

This knowledgebase was the subject of a web course pilot test intervention in adult vocational courses (assistant/enrolled nurse) conducted between January and March 2019. The aim of this pilot study was to assess the effects of self-assessed knowledge and learning through web-based PFA course intervention on adult vocational courses. The hypotheses addressed in this study are:

- 1. The students perceived their self-assessed knowledge to a greater extent in the webbased course than in traditional face-to-face course;
- 2. The students in the web-based course evaluated the course more positively than the students in the traditional face-to-face course.

The development of this intervention was made possible by funding from the EU Interregional Central Baltic Sea Project, NURED. The NURED project has the overarching aim of developing aligned curricula in the field of home care nursing in the Central Baltic region.

2. Rationale

The majority of staff working in Scandinavian ID practice have no significant training in supporting people with ID before they start working in ID practice. They may have been employed even though, for example, they lack basic course and do not have adequate skills. The staff may also lack the specific skills that may be necessary. Without specific competence, the support provided can counteract its purpose. The PFA model offers guidelines and a theoretical foundation that is recommended for use in Scandinavian ID practice. Staff training in ID practices has different effects. In the present study, we attempt to identify the effects of using a web-based PFA course as a complement to the national curriculum for vocational courses in the course, Special Pedagogics 1, at the upper secondary school level in Sweden. This pilot study aimed to investigate students' estimates of the effects of web-based PFA course intervention in adult vocational courses.

3. Intellectual Disability Practice in the Scandinavian Context

The majority of the professionals working with people with ID are given the crucial human services role of maintaining the wellbeing of the people they serve [16]. They have been recognized as important service providers [17] and facilitators of quality of life [18]. However, these professionals generally do not have any specific course in supporting people with ID. Course is considered to play a significant role in quality development, in terms of sharing similar goals, skills and knowledge needed to work effectively together and creating fundamental standards to use in the practical field [19]. Additionally, since people with ID disproportionately have more physical and mental problems compared with the general population. According to Lunsky [20], it is a complex practice for professionals.

Overall, ID practice benefits from staff-training interventions. For example, training workers in emotional intelligence can positively affect the support provided by them in terms of increased autonomy, relatedness, and competence [21]. Research has shown that active support significantly increases the amount of time that people with ID spend doing all types of activities at home [22]. Furthermore, according to Totsika, Toogood and Hastings [6], studies have demonstrated that the provision of active support leads to statistically and clinically significant improvements in engagement and community participation. Although no assumption can be made about whether active support enhances the life situation of people with ID, measuring any such improvement is challenging. One study [23] explored the experienced knowledge and courses related to the ID practice of ID practice workers. It was found that that those who had worked for two to five years in ID practice, and had PFA training, estimated their knowledge of ID and ID practice to be at the same levels as those who had worked for 16 years or more in ID practice (with or without PFA training). This was interpreted as evidence that the PFA course could work as a foundation for developing the necessary skills for ID practice, and from the viewpoint of employers, the provision of a week-long training session to employees increased their confidence levels to those of workers with decades of ID practice experience.

3.1. PFA

PFA involves working from a life perspective, with continuity, and it uses an individual's skills and self-perceptions of meaningfulness. PFA is a craftwork practice for the provision of professional care, support, and service to people with ID. The theoretical foundation of PFA lies in Aaron Antovsky's [24,25] salutogenic theory of every person's right to experience a sense of coherence (SOC). Another major source of inspiration for PFA is TEACCH (Treatment and Education of Autistic and Related Communication-Handicapped Children); an American habilitation program which, in Swedish, is usually called clarifying pedagogy [26]. PFA's point of departure is in supporting a person with ID to seize better opportunities to live a meaningful life. The PFA approach aims to guarantee that people with even the most significant disabilities have continuing daily support to be involved in a variety of life activities and opportunities of their own choice. In brief, PFA intends to create individually adjusted conditions for a life in which an individual's skills are used and difficulties are compensated for. Thus, PFA is a craftwork supporting a person with ID in creating a meaningful existence according to his/her own definition. PFA is an adaptation, but it is the workers who adapt their attitudes, support, and the environment to persons with ID. Adapting PFA provides ID workers with insights into how a person with ID understands and experiences their surroundings and helps the workers to link the person's understanding, experiences, and surroundings [27]. Cornerstones and guidelines for working using PFA include knowledge of cognitive functions, knowledge of the individual person with ID, and knowledge about disability and how it can affect the persons' personal environments. Personal environments refer to specific settings and activities in which individuals participate during their everyday lives, knowledge and skills to apply

adaptations and tools that can compensate for difficulties (both physical and cognitive), and knowledge of the organization in which PFA is applied [11]. The implementation of PFA requires workers to adapt their behaviors to foster attitudes and environments that are based on the individual needs of persons with ID, and PFA often entails working differently and, perhaps, using an untraditional approach. For ID practice workers, therefore, this means having an open mind to continually increase their understanding of unique individuals with ID, and this is an ongoing process of development that aims to create a meaningful life, as defined by the person with ID [27].

PFA was developed in the Eskilstuna municipality, and it has attracted considerable interest nationwide. Today, PFA is more or less implemented in all care and support services provided by the Eskilstuna municipality to persons with ID.

3.1.1. Web-Based PFA Course

The web-based PFA course module was created over a period of nearly one year through close collaboration between the PFA experts from Eskilstuna municipality and a web course company. The work included extensive phases of manuscript preparation and production. The entire web-based PFA course module consists of approximately 6 h of content divided into six themes. This module is offered through the Mälardalen University course platform, called Canvas software. Figure 1 illustrates the homepage of the web-based PFA course module.



Figure 1. A screen from the web-based PFA course module.

The themes in the web-based PFA course module are PFA, the brain and cognition, intellectual disability and autism, cognition, SOC and stress, the craftwork of PFA, and PFA and conditions for wellbeing. The web-based PFA course module on Canvas have a self-instruction structure and didactics, with illustrative animations, short lectures, discussions, and various exercises. The learning outcomes of the web-based PFA course module are shown in Figure 2.

The content of the web course's different sections:

- Introduction
- Why PFA?
- Brain and cognition
- Intellectual disabilities and autism
- Cognition, stress and sense of control (SOC)
- Handicraft of PFA
- PFA and conditions for feeling good

After completing the PFA web course, students will

be able to reproduce PFA's history and the initiatives for developing PFA. In addition, students will
understand the meaning of PFA in support and service within home care focused on ID practice.
 Furthermore, students will have gained an initial understanding and awareness of the theory of
Salutogenesis and SOC—Sense of Coherence.

• be able to describe cognition, mentalization, perception, and central coherence, and have the competence to explain how cognitive functions are applied in their daily life.

have knowledge of ID and its influence on cognitive functions as applicable in the home care context.

 have knowledge of how stress effects functioning of people with ID and understand how it is related to cognition and needs of control.

 based on knowledge of PFA, cognitive functions, and ID, make assessments of the abilities and difficulties of a person with ID or autism in defined situations and have the skills to create or develop adaptations to compensate for difficulties in a defined situation in the home care context.

• be able to discuss the benefits of practising PFA in the home care context, how it affects people with ID or autism, and how the student as a worker can make a difference to the wellbeing of persons with ID or autism.

 be able to manage complex discussions on the benefits of practising PFA in the home care context, how it affects people with ID or autism, how to solve complex and unpredictable problems, and how a

worker can take responsibility for managing professional development to make a difference in the wellbeing of persons with ID or autism.

Figure 2. Web-based PFA course: learning outcomes.

3.1.2. Upper Secondary School: Health and Care Programme and Vocational Course Health and Care

The web-based PFA course module was developed to complement the national healthcare programme (the course Special Pedagogics 1) at the upper secondary school level, in related vocational courses for adult students, or as a workplace course for professionals engaged in ID practice. The national Swedish three-year secondary course healthcare programme provides students with the necessary skills for working in healthcare and social services. The healthcare programme reflects a generalist course regulated by a national curriculum on healthcare and social care [28]. Graduates from the programme can be employed as enrolled nurses, assistant nurses, or staff in ID practice.

Adult students can complete this healthcare programme as a one-year vocational course. The vocational course is similarly regulated by the national curriculum, and the completion of the course leads to a vocational graduation in a particular field. The national curriculum for the course, Special Pedagogics 1 (equivalent of upper secondary school and adult vocational course), is shown in Figure 3.

The national course Special Pedagogics 1 aims to develop students' knowledge of the relationship between society and people with disabilities. In the course, students will develop knowledge of various societal efforts for people with disabilities. Moreover, the course will develop students abilities to meet people with respect and work on the basis of an ethical and inclusive approach that is grounded in a democratic value base and is consistent with human rights. The course covers both personal and societal attitudes to and values of people's differences and rights. The course Special Pedagogics 1 includes learning about

- Different functional impairments and how they affect people's lives, learning, and participation in society
- Pedagogics
- Communication
- Professional approach, norms, values, and attitudes
- Methods, support, and assistive technology
- Laws, documentation, and needs assessment

(Swedish National Agency for Education, 2019 [28])

Figure 3. National course Special Pedagogics 1.

4. Methods

This study targeted adult students from two upper secondary schools (vocational health and care programme). The students were divided into one experimental group and one comparison group. During data collection, all students were taking the course Special Pedagogics 1. The efficiency of the intervention was tested with an anonymous pre-test/post-test design. In other words, only the participants had the specific ID codes that the researchers used to compare the pre- and post-test results. The study was conducted in person by one of the researchers (SO) during regularly scheduled classroom sessions for both groups of students.

The study was carried out as a web survey based on a quantitative approach. Two equivalent group experimental designs were employed to this end. Experimental studies invariably analyse a cause-and-effect relationship. Both the experimental group and the comparison group completed their course in traditional settings, but the experimental group was additionally exposed to the web-based PFA course intervention, which was not the case with the comparison group. Subsequently, a post-test was conducted to determine the experiences of the two courses. The experimental factor was mainly introduced to determine whether there would be a significant difference between the traditional method of teaching and the web course intervention in terms of the knowledge acquired by the students.

The researcher had never met the students before and only saw them for a couple of hours in each class. For the rest of the course, both classes proceeded with their regular teachers. In the case of the experimental group, the web course acted in a complimentary manner to the regularly scheduled class. An educative response was provided to the teacher whenever the teacher felt it was necessary. When any point was unclear, additional time was given to the teacher in the experimental group to demonstrate the instructions and the web material once again, whenever necessary. For the researchers, "confidentiality" is a general term that implies all information is kept hidden from everyone except the primary research team. Anonymity is one form of confidentiality—that of keeping the participants' identities secret. In this study, the first researcher saw the students' faces twice, once at the start of the course and once after commencement of the course. We only

used codenames in the survey, which mean the students can never be traced from the data presented about them. True anonymity is never achievable because the first researcher did meet them, even if only once or twice, and there will always be at least one person with access to participant information. We have addressed the question of anonymity insofar as it applies to persons other than the primary researchers.

4.1. Participants

All participants were students in an upper secondary school in the middle of Sweden, and all of them had voluntarily expressed interest in the course Special Pedagogics 1 between December 2018 and March 2019. The course Special Pedagogics 1 appeared identical to both groups, but the experimental group took the course in one school, and the comparison group went to another school. Most students were immigrants with Swedish as their second language, and most had the goal of working as enrolled or assistant nurses after completing their one-year adult course. Although Swedish was the second language for most of the students, all students had the certified Swedish language skills required for upper secondary school studies in the country. The experimental group took the PFA web course as a complement to their studies in the Special Pedagogics 1 course. In the pre-test, 15 participants appeared in the first measurement, but only 12 appeared in the second measurement.

In the matched comparison group, all conditions were identical to those in the experimental group. The two groups had the same distributions of men and women and same percentages of immigrant Swedes. Moreover, the participants in both groups had similar course backgrounds (as summarized in Table 1). The course Special Pedagogics 1 was identical in both schools.

	Experimental Group (n = 12)	Comparison Group (<i>n</i> = 46)	
Gender			
Women	10	45	
Men	2	1	
Age			
M	31.58	36.29	
SD	7.26	8.27	
Course			
Elementary school	10	38	
University	0	2	
Vocational course	2	4	
Other	0	2	
Work experience (years)			
M	1.17	2.25	
SD	2.66	4.27	

Table 1. Descriptive statistics of participant groups.

In the comparison group, there were 56 participants in the pre-test and 46 participants in the post-test. According to the teachers' reasoning, dropouts from both courses were ascribed to some students realizing too late that they that they could not put as much work into completing the course as they needed. Another reason could be students' lack of readiness to learn and invest the effort required to complete the course. A few students informed the teachers about their feeling that this programme was not for them and that they wanted to learn something else.

4.2. Procedures and Data Collection

This study was conducted under an EU project called NURED (Interregional Central Baltic Sea Region, https://www.arcada.fi/en/research/research-areas/nured-nurseeducation-development, accessed on 21 April 2021), the Swedish work packages of which focus on the field of ID practice. The population and sample consisted of students from two different schools (providers of the vocational health and care programme to adult students) in a medium-sized municipality in central Sweden.

As this was an intervention study, we did not randomize the participants. Several schools offering courses on disability were contacted. When a school expressed interest, the course teacher in that school and the researchers planned how the teacher could use the web course to complement the regular course materials. In this class, only traditional teaching was offered, and the PFA web course was not offered. An informed consent process included both written and verbal consent for participation in the study and the participants gave consent before they participated in the research. They were informed about what it meant for them to take part in the study, and that they participated freely. The different questionnaires of each participant were matched using a code to ensure the participants' anonymity.

The pre-test was performed on the day on which the course commenced because we wanted to gauge the amount of knowledge that they thought they had before they entered the course. The participants in both groups answered the same questions on the pre-test and on the post-test at the end of the session (three months after the pre-test). The first researcher (SO) had contact with the two teachers of the two groups to decide which day was the best for the researchers to go to the classes. The students in the experimental group and the comparison group were in different schools that are far apart from each other. The students in the experimental and comparison groups never saw each other during the course.

In the first measurement, the participants answered a questionnaire with an initial section containing four items about background information (gender, age, course, and work experience). The following questionnaire contained self-reporting questions about their knowledge of the various topics covered in the course. In the second measurement, the students were asked the same questions as those in the first measurement, in addition to follow-up questions to all students about their experience of the course and questions to the students in the experimental group about the intervention (see Table 2). Students' responses to these questions were obtained using a Likert-type scale ranging from 1 to 5, with 1 corresponding to "very bad/unsatisfied/never" and 5 corresponding to "very good/satisfied/always". Responses to the questions pertaining to the contents of the different sections in the web course were recorded using a Likert-type scale ranging from 0 to 4, with 0 corresponding to "have not taken any section in the Web course", 1 corresponding to "bad", 2 to "mostly bad", 3 to "mostly good", and 4 to "very good". The last two questions were, "How likely would you be to participate in a similar web course again?" and "How likely would you be to recommend this course to others?" Responses to these questions, too, were recorded using a Likert-type scale ranging from 1 to 4, with 1 corresponding to "not likely at all" and 4 corresponding to "very likely".

4.3. Ethical Considerations

The research was carried out in accordance with the Declaration of Helsinki [29], and all of the participants were informed about the research and its effects, as well as they were been able to freely decide whether they wish to participate [30]. Referring to the Swedish law of research ethics, no ethical approval was required for this study. Nonetheless, the procedure adhered to the ethical principles, such as that in which information related to the students' participation, handling of their personal data, informed consent, withdrawal of consent to participate in the research project at any time, and confidentiality [30,31] was provided to all participants through an information letter and later repeated verbally by the researcher (SO) before they started answering the questionnaire.

Question Areas	Experimental Group	Comparison Group
Pre-test		
Background questions Gender, age, course, and work experience	Х	Х
Course in general Corse preparation and former experience of web courses	Х	Х
Knowledge questions The concepts: PFA, SOC, cognition, and intellectual disabilities	Х	Х
Post-test		
Knowledge questions The concepts: PFA, SOC, cognition, and intellectual disabilities	Х	Х
Contents of the web course Introduction; Why PFA; The brain and cognition; Intellectual disabilities and autism; Cognition, stress, and SOC; The Handicraft PFA; and PFA and wellbeing	Х	
Follow-up questions Experiences of web course/course: easy to understand, satisfaction, fulfilment of course expectations, value of learning outcomes, and interest in web courses and possible recommendation to others to sign up for web-based PFA course	Х	Х

Table 2. Overview of pre-test and post-test questions for the experimental group and the comparison group.

4.4. Data Analysis

The analyses were performed using Statistical Package for the Social Sciences (SPSS, version 24.0. IBM Corp., Armonk, NY, USA). To determine the existence of normal distribution, the Shapiro–Wilk test for normal distribution was performed. This test is employed when the number of participants is less than 50, in which case, a histogram of normal distribution would be difficult to read [32]. All variables were subjected to descriptive statistical analysis to calculate the mean, standard deviation, and percentages. Furthermore, descriptive statistics were calculated for the group overall, as well as for subgroups by age and gender. Finally, descriptive statistics were used to obtain the characteristics of the experimental and comparison groups. Descriptive, differential, and inferential statistics were used in the study. These include the mean, standard deviation, and *t*-test. The best method for analysing the experimental data is to view the pre- and post-tests as a repeated measures/split-plot design or as a profile of two measurements for each subject [33]. Moreover, we used statistically significant variables with *p*-values of lower than 0.05 (based on two-sided tests), which have been reported in the text. Arain et al. [34] performed statistical significance tests in their pilot study to determine whether the preliminary results and, subsequently, the significance level can be presented [35]. Pilot studies are focused more on learning than on confirming, which is why we focused on descriptive statistics. Pilot studies are not formally powered to assess effects. However, the findings of such studies may be of interest when calculating confidence intervals to describe the range of effects. We conducted this pilot study to provide preliminary indications of the efficacy of an intervention because pilot studies have a significant part in intervention progress and can increase efficiency and validity in a study [36].

4.5. Reliability and Validity

The reliability of the instrument, as measured by internal consistency, was found to be satisfactory (Cronbach's $\alpha = 0.78$). The test–retest reliability was r = 0.70, p < 0.000. The correlation value indicated that the tool was reliable. The same researcher (SO) instructed both the experimental group and the comparison group. Both groups were considered to have received the same attention from the researcher, although the experimental group was taught by their teacher and additional IT support was provided for accessing and using the web-based PFA course module.

5. Results

To evaluate the effect of the PFA web course, a *t*-test was conducted to comparatively examine the self-assessed levels of knowledge of the experimental and comparison groups in the pre-test and the post-test. Both groups estimated that they were well-prepared for the course. The question was "How prepared do you feel for this course?" Students in the experimental group were slightly more prepared (3.92) than those in the comparison group (3.00), p < 0.001.

5.1. Differences in Perceived Self-Assessed Knowledge between the Pre- and Post-Tests

To examine the participants' self-assessed knowledge of PFA, SOC, cognition, and ID, a pre-test and a post-test were conducted (see Table 3). The first measurement in this study examined whether the participants had gained additional knowledge of PFA between the pre-test and the post-test. The post-test results showed that both groups significantly increased their knowledge of PFA (Table 3).

Table 3. Differences in pre-test and post-test for experimental and comparison group on measured variables.

	Pre-Test		Post-Test		t Value	Cohen's d
	M	SD	M	SD		concir 5 u
Experimental Group						
PFA	2.58	1.31	4.33	0.65	-4.26 *	-0.69
SOC	4.17	0.84	4.42	0.67	-1.00	-
Cognition	3.58	1.00	4.25	0.62	-2.00	-
ĪD	2.67	1.07	4.17	0.58	-4.45 *	-1.74
Comparison Group						
PFA	2.40	1.12	3.33	1.03	-4.20 *	-0.86
SOC	4.06	1.12	3.72	1.19	1.14	-
Cognition	2.69	1.24	3.44	0.91	-3.00 *	-0.69
ID	2.49	1.31	3.82	1.18	-4.99 *	-1.07

Note: * *p* < 0.05.

There were no significant differences in the pre-test measures between the experiment and comparison groups, excluding cognition (t = 2.25, p = 0.29), where the experiment group had more knowledge about the concept of cognition (M = 3.58, SD = 1.00) than the comparison group (M = 2.69, SD = 0.29). Both groups had considerable prior knowledge of SOC. Therefore, the pre- and post-test scores for knowledge of SOC were not significantly different. Three months after the pre-test, both groups reported a slight increase (see Table 3), but there was no significant difference between the pre-test and post-test scores of the experimental and comparison groups in terms of SOC knowledge attainment. However, as can be inferred from Table 3 that SOC knowledge decreased in the comparison group between the pre- and post-tests.

The *t*-test results (Table 3) indicated that the students in the experimental group tended to have significantly larger differences between their pre-test and post-test scores in terms of cognition knowledge. Before commencement of the course, the experimental group estimated a higher knowledge score (3.58) than the comparison group (2.69). Table 3, however, clarifies that both the experimental group (4.25) the comparison group (3.44) had significantly higher cognition scores upon course completion.

Moreover, there was a significant difference between the pre-test and post-test ID knowledge attainment scores of the two groups (Table 3). The scores of both groups increased substantially after course completion, but the ID knowledge attainment score of the experimental group (4.17) was higher than that of the comparison group (3.83).

5.2. Differences between the Experimental and Comparison Groups

Possible differences between the groups after course completion are summarized in Table 4. Regarding the section on PFA, there was a significant difference between the experimental and control students in terms of how they maintained their PFA knowledge in the post-test stage. The knowledge levels of both groups increased, but the knowledge level of the experimental group increased by a greater margin. As can be inferred from Table 4, the obtained t value of 3.19 was significant at p = 0.003. This suggests that the experimental group exhibited higher awareness levels after course completion.

Table 4. Post-Test differences between experimental and comparison group on measured variables.

	Experimental Group		Comparison Group		t Value	Cohen's d
	M	SD	M	SD		
PFA	4.33	0.65	3.33	1.03	3.19 *	1.16
SOC	4.42	0.67	3.72	1.19	1.92	-
Cognition	4.25	0.62	3.44	0.91	2.84 *	1.04
ĪD	4.17	0.58	3.82	1.18	0.95	-

Note: * *p* < 0.05.

The differences between the groups in terms of SOC indicated that the students in the experimental group estimated their SOC knowledge to be slightly higher than did the students in the comparison group, and this difference was significant at p = 0.006 (Table 3).

Both groups answered the question "How well do you know the concept of cognition?" The experimental group estimated their cognition knowledge as being at a significantly higher level in comparison with the comparison group. Both groups had gained additional cognition knowledge after completing the course, p < 0.001. The *t*-test results indicated that the experimental group estimated their level of knowledge to be higher than that of the comparison group.

ID was covered in the course content. All students were asked, "What do you know about ID?" Both groups estimated their level of ID knowledge as being high after course completion, and there was a marginal difference between the two groups. The experimental group reported that their ID knowledge was of a somewhat higher level than that of the comparison group, but there was no significant difference between the two groups in this regard.

5.3. Course Evaluation

One of the post-test questions queried whether the course content was easy to understand. The results indicated that both groups thought that the course content easy to understand, but the experimental group (4.17) estimated their web course satisfaction to be significantly higher than that of the comparison group (3.03), p < 0.001.

To a question that sought to determine whether the course had meaningful content, the responses indicated a difference between the groups. The experimental group (4.42) experienced the meaningfulness of the course content to a greater extent than the comparison group (3.69), and the difference was significant at p = 0.002.

The students were asked whether what they learned in the course would be useful to them. Both groups estimated that they had gained valuable knowledge, but there was no significant difference between the groups in terms of usefulness of the knowledge learned. The experimental group (4.58) estimated a higher level of usefulness of the knowledge learned than the comparison group (3.89), p = 0.085.

The last question was whether the students would like to attend a similar course in the future. Both groups indicated that they would attend a similar course, but there was a significant difference between the two groups. The experimental group (3.25) responded more positively than the comparison group (2.86), p = 0.004.

6. Discussion

The primary role of this pilot study was to assess the effects of self-assessed knowledge and learning at a web-based PFA course intervention on adult vocational course. Pilot studies have a few inherent limitations; for example, the data and their implications are specific to the test participants and generalizing the results to the population is problematic. However, pilot studies are a necessary first step in exploring novel interventions and appraising their feasibility, which is helpful for determining the adjustments needed in the planning and design of a larger and more useful experimental study. The use of the web-based PFA course module as a complement to Special Pedagogics 1, which is a part of the national curriculum for vocational courses at the upper secondary school level in Sweden, enhanced the learning outcomes.

The results of the first hypothesis, revealed that the students perceived self-assessed knowledge to a greater extent in the web-based course compared to the traditional faceto-face course. Students receiving the PFA web-based course had higher self-assessed knowledge scores. The *t*-test results demonstrated that the experimental group had significantly higher scores on the post-test compared to those on the pre-test. Moreover, the performance of the comparison group on the post-test was superior to that on the pre-test, but they were not as high as those of the experimental group. This finding suggests that the students in both groups increased their knowledge, but the web-based PFA course module enabled students to increase their knowledge in several aspects. In such learning environments, students are not only dynamic learners but collaboratively, they also become knowledge inventors when consuming knowledge to resolve problems and to innovate [37]. The web-based PFA course module allowed the students to watch videos, read texts, complete checklists, and take tests on attitudes and values. Moreover, the module helped the students visualize different conditions to establish concrete pictures from abstract situations (deep learning or deeper understanding) in learning through seeing and doing, transforming words into recognizable pictures, and repeating the information. To avoid forgetting what one has learned, the learning must become a permanent memory, and this usually requires repetition [38]. With web-based courses, students can repeat all the information for a long period of time and transfer old knowledge to new situations. These are the suggested factors that explain the higher mean post-test scores of the experimental group compared to those of the comparison group. This finding is consistent with the findings of other studies on how web-based course improves students' learning. The use of information and communication technology, such as the web-based PFA course module, increases students' potential for supported classroom conversations and collective learning [39-41].

Overall, the Internet and web-based course allow for the creation of a new type of learning environment. The web-based course is considered effective for enhancing students' insightful thinking and self-confidence, as well as for reducing knowledge anxiety [42]. It is important to mention that a web-based course places greater emphasis on the personal responsibility and accountability of students. Web-based learners are free to decide the pace and timing of their studies and are, as such, ultimately key to their own learning process. For some students, it is not easy to use a computer or have the motivation or discipline to study. Our research indicates that many students prefer the online course and indicate that it is appealing, at least initially, because it is more convenient for them. However, in this study, we did not measure academic scores or "deep learning", which would tell us more about if they attained more knowledge in the web course or not. This is a significant aspect to consider when thinking about the overall benefits of the online course in meeting the course goals.

One explanation for the apparent missing significant result regarding students' ID knowledge could be that the students in both groups had already studied the area of disabilities in general when they started the course, which would have affected both the pre- and post-test measurements. Furthermore, we believe that they did not have distinctive, differing ID knowledge as compared to the knowledge of other disabilities.

Moreover, the *t*-test results indicate that the experimental group was better prepared than the comparison group. The experimental group scored significantly higher in terms of attained knowledge with regard to understanding and estimating the meaningfulness of the course (4.49 with a maximum score of 5.0). This may be because the web-based delivery of the PFA course module motivated the students to understand the concept of PFA by using the animations, pictures, texts, and audio components of the PFA web course. The results are similar to those obtained in previous studies on web courses and learning effects. Studies have reported that a major benefit of the web course is that collaborative learning through web platforms offers possibilities for sharing knowledge, retaining information, and creating flexible opportunities for discussion [43–45]. In this study, the experimental group increased their SOC knowledge; by contrast, the SOC knowledge of the comparison group decreased. This is because the contents of the web-based PFA course module contextualize SOC in ID practice.

The results of the second hypothesis: that the students in the web-based course evaluated the course as being more positive compared to the students in traditional face-to-face courses, shows that the experimental group scored significantly higher in terms of course satisfaction. This can be ascribed to the fact that the experimental group had, in comparison, about 6 h of additional lectures and course activity time, which facilitated deeper learning about ID practice in the web-based PFA course module. Furthermore, the web-based PFA course module, through the use of information and communications technology, could have been perceived to more stimulating and motivating, thus deepening the learning by contextualizing former knowledge (e.g., SOC knowledge) in a new context; that is, the ID practice context. The *t*-test results concerning knowledge (PFA, SOC, cognition, and ID) indicated that the experimental group scored significantly higher than the comparison group on all factors, except for ID knowledge. This may be explained by the fact that teaching and learning through visual images is effective for strengthening students' learning abilities and making the learning process more engaging and fun. Another aspect that might have affected the results could be the students' language skills. Most of the participating students had Swedish as their second language. The potential of repeated usage of the web-based PFA course materials might have positive effects if students have language difficulties. There were also differences between the two groups regarding the question that sought to determine whether the course had meaningful content. The experimental group experienced meaningfulness of the course content to a greater extent than the comparison group. The experimental group was also more positive than the comparison group to attend a similar course in the future. One explanation could be that the web course facilitates collaborative and consecutive or simultaneous learning among students and/or teachers. Lessons are intended to produce specific learning outcomes, which are defined in structured lesson plans. Learning is evaluated based on students' performance on objective tests [46]. The use of information and communication technology in the classroom (in this case, the web-based PFA course module) provided the experimental group with opportunities to increase their knowledge. Thus, an additional advantage of using the web-based course as a course tool is increased student engagement in learning [47]. Moreover, the web-based course is a good opportunity for working people. A focus on upskilling through a workplace course can contribute considerably towards fulfilling society's requirements for educated employees and their unique contextual knowledge accumulated through diverse daily experiences [47,48].

In the future, we must strive to fulfil all student needs. There are diverse types of needs, and students are more flexible in this day and age. The Internet is a vast source of information, and communication and connection opportunities are available to anyone with Internet access. Many students have mobile devices and computers. This is potentially great for improving course outcomes, but by themselves, hardware devices and networks do not improve learning. Years of research [46,48–50] indicate that high-quality learning resources are needed as well. Learning resources as online learning may be able to produce additional discussions and to advance the quality of learning, as well as having the practical

benefits of inspiring students' contributions and increasing the cost-effectiveness of the course, compared to a traditional face-to-face course [51,52]. Studying online gives students greater flexibility and allows them to select their own learning environment, which works best for their needs. Web-based courses can potentially enable students to learn effectively by using novel teaching methods [53]. It is clear that web-based courses are entering the mainstream and becoming a growing market as they continue to give more people access to learning opportunities [54]. In a wider context, students can take a web-based course from anywhere in the world. This gives students broader insights into the systems and policies of other countries. If a web-based course is imparted in English, on an international level, it can be "open" for people from all around the world, even for individuals that have access to the Internet in developing countries. Moreover, there are opportunities to get students to work for an external audience and to collaborate with teachers and students from all over the world. In Sweden, the school policy states that upper secondary courses are both voluntary and free of charge, and all young people have the right to start a secondary course up to the spring term in the year they turn 20. Therefore, pedagogics should be flexible to meet students' needs.

In the future, more research is needed on the value of web-based courses and the ways in which they can benefit students. Human contact with the teacher remains important, and the teacher's ability to teach is essential for realizing the expected learning outcomes. Based on our experience with this experimental intervention, we believe that, before implementing a full trial of this web-based course module, one must educate teachers on how to use web-based courses in a manner that maximizes the fulfilment of students' needs. Educators and teachers should collaborate to define practice-related problems that can be addressed through digital learning and the associated types of evidence that can be collected to measure and inform any progress in addressing these problems. Moreover, it would be essential to investigate whether and how digital learning resources can be used to teach aspects of deeper learning, such as complex problem solving, and promote the transfer of learning from one context to many contexts. In the future, more research should be conducted to investigate the effectiveness, efficacy, and improvement of online teaching and learning. In this study, there was no empirical evidence or research to validate whether online course improved students' academic outcomes. Therefore, future research could perhaps focus on an in-depth analysis of online instruction practices, students' academic achievements, and implementation for online course design and instruction.

Can web-based courses compete with traditional courses? The findings of this study indicate that the students and the teachers shared with us both advantages and disadvantages of web-based courses. The disadvantages were technological problems associated with the course, and this was reinforced by the teacher's lack of knowledge of the learning platform. The advantages of the web-based course as a complementary tool provided the students with different opportunities in a pedological way to learn, promoted independence from teachers and active learning with self-responsibility for the course, and flexibility given the "anytime, anywhere" access offered by the learning platform.

Limitations

The main role of a pilot study is to examine the feasibility of a research project. Therefore, the findings of the present pilot study can only be used to examine the feasibility of web-based learning for the students included in the study. The feasibility results cannot necessarily be generalized beyond the inclusion and exclusion criteria of the pilot. Although the results of the present study are encouraging, the findings should be thoroughly understood because there were a few critical limitations in the pilot study in terms of the interpretation of its results. The first limitation was that the study was based on self-reports. Thus, the students estimated their own knowledge rather than the researchers examining their knowledge. Another limitation, which may be related to the first limitation, is that some uncertainty exists about whether the students answered the questionnaire correctly. Swedish was the second language of most of the participants, and even though we tested the questionnaire before the pre-test, there was a risk of misunderstanding, in that some students may not have understood the meanings of the questions, although all students had sufficient Swedish skills required for this level of course. Another limitation of this pilot study was the small sample size. Nonetheless, pilot studies do not provide valuable information about the population effect size because the estimates are quite distinct to the small samples.

Moreover, there were technological challenges that could have affected the students' willingness to participate in the course and greatly impacted the web-based course module. Login problems and the inflexibility of the web course occasionally created frustration among the students.

Another limitation could be the Hawthorne effect [55]. This is the tendency of some people in the experimental group to work harder and perform better when they participate in an intervention study. The participants in an experimental research study may change their behaviour owing to the attention that they receive from the researchers (and, in this case, the teachers). This bias risk was considered when designing the study and interpreting the results. Significantly, however, the same researcher (SO) gave the comparison group similar attention when introducing the study.

7. Conclusions

The Internet has changed the ways in which people acquire and share knowledge and interact. This pilot study provided empirical evidence that the informed and sustained use of knowledge building through complementary web-based PFA course significantly improved the self-assessed knowledge of students taking Special Pedagogics 1. Based on the findings, web-based PFA courses are a valuable asset for students learning about ID practice. In general, we suggest that the PFA model and web-based PFA course are valuable tools for complementing the national course, Special Pedagogics 1. Furthermore, web-based PFA courses are considered useful for imparting workplace courses to workers engaged in ID practice in Scandinavia. Web-based PFA courses can help impart to learners' specific guidelines and a theoretical foundation for ID practice. However, this was not the focus of the present study. Both groups perceived that they gained more knowledge after the course, but in the experiment group they experienced that they gained even more knowledge. Web-based courses have more flexibility, in letting students choose when to start and complete certain assignments. Web-based courses could benefit staff within municipal residential care services as a competence provision, and the students could both work and study at the same time. The knowledge from the studies can be directly applied into workplaces. However, we must remember that not everyone prefers web-based courses, and we should keep this in mind when contributing to competence provision by way of web-based training.

Further research is required to explore whether web-based PFA courses can be a resource for distributing information to students and furnishing workplace courses, as well as the short- and long-term results of doing so. These findings indicate the value of web-based PFA courses for ID practice workers in Scandinavian.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki. According to The Ethics Review Authority guidelines an ethical review and approval were waived for this study, due to not include any processing of sensitive personal data or personal data about violations of the law. There was also no personal data on information that could

be directly or indirectly attributed to a person in the survey. There was also nothing in the study that involved a physical intervention on the researcher or a method that aims to affect the researcher physically or mentally.

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Data Availability Statement: All the data are stored at the Mälardalen University and could be available if it is requested.

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