Masteroppgave

Master i Læring i komplekse systemer

Fordypning i atferdsanalyse

2011

Artikkel 1

Etablering av trenerferdigheter: en oversikt over anvendte opplæringsmetoder for "avgrensede repetisjoner".

Establishing training skills: a review of the applied training methods for discrete trials teaching

Artikkel 2

Remote staff training: The effect of training discrete trials teaching skills using videoconference

Opplæring fra avstand: Effekt av å bruke videokonferanse for opplæring av trenerferdigheter i "avgrensede repetisjoner"

Aina Wiola Hay-Hansson

Høyskolen i Oslo og Akershus

Takk til

Studien i denne masteroppgaven har bokstavelig talt handlet om læring i komplekse systemer, og det at studien lot seg gjennomføre er takket være mange personer som på hver sin måte har gitt viktige bidrag.

Først av alt ønsker jeg å gi en stor TAKK til min kunnskapsrike og dyktige veileder, dr. psychol. Sigmund Eldevik, BCBA, for tilgjengelighet og taktfast oppfølging med engasjement og inspirasjon både i forbindelse med studien, skåringer og den krevende skriveprosessen. Til og med statistikk ble stas etter hvert. Det har vært fantastisk lærerikt. TUSEN takk!

En stor takk til alle deltakerne og barna som deltok i studien for glitrende innsats! Uten dere hadde jeg ikke hatt noen data. Takk til ledelsen ved begge opplæringsstedene for å ønske meg velkommen med studien min, for gjennomføring av rekruttering av deltakerne og barna, og for imponerende løsningsorientering ved uventede situasjoner.

Takk til Bodil Bach (nå ved Tromsø Telemedicine Consult) for engasjement og gjentatte sjenerøse innspill ut i ditt nettverk i planleggingsfasen av studien. Takk til Freddy Lillevik (videoansvarlig, Norsk Helsenett) og Henrik Bakken (produktsjef, Movi™, Cisco) for opplæring og tett oppfølging sent som tidlig via både videokonferanse og telefon. Takk til Terje Bremseth (Sykehuspartner) for bistand i forbindelse med nettverk og studio ved Habiliteringsavdelingen.

En stor takk rettes også til ledelsen på min arbeidsplass ved Habiliteringsavdelingen, Vestre Viken HF, May Britt Bunæs og Kari Krum Bang, for motivering og flott tilrettelegging for at studien kunne bli gjennomført på vår arbeidsplass. Takk til mine kollegaer Lisa Ingebrethsen og Torunn Mayer for kjempeinnsats! og uvurderlig hjelp i forbindelse med

reliabilitetsskåringene, og til kollega Trond Aasland (videokonferanse-ansvarlig) for teknisk bistand. Takk til sekretær Anne Kringen Gabrielsen for sporty innsats med å besvare mine test-sendinger på videokonferanse.

Stor takk til BCBA-gruppen ved Senter for tidligintervensjon og Sigmund Eldevik for lærerike samlinger, inspirerende diskusjoner og kontinuerlig faglig påfyll underveis.

Mine supre venner og min mann som stilte opp til imponerende rollespill for at jeg skulle få gjennomført pilotstudien; Hege Kaspersen Nilsen, Terje Vestøyl, Charlotte Gran, Thuva Furuseth, Tove Røren og Einar Hay-Hansson. Tusen takk!

Jeg ønsker spesielt å takke familie og nære venner for utholdenhet, støtte og oppmuntring i et langt studieløp som også har krevd sitt i vår sosiale omgang. Takk for at dere fremdeles er her!

Min kjære Einar. Det finns ikke nok superlativer til deg. Din store tro på meg. Din støtte, omsorg, oppmuntring og humor. Du har holdt fortet vårt, hjemmet og familien gående i en ekstra krevende tid. Middag klar, timeplan ryddet, veien klar for at jeg skulle få jobbe videre. Min kjæreste og beste venn. Tusen, TUSEN takk.

Nøtterøy, 14.11.2011

Aina Hay-Hansson

INNHOLDSFORTEGNELSE

Oversikt over tabeller, figurer og appendix i artikkel 1

Index: tables, figures and appendix in article 2

Abstract - article 1 and 2

The purpose of article 1 is to present a review of the published literature on how to train staff to conduct discrete trials teaching (DTT). Autism spectrum disorders (ASD) are related with complex learning challenges. DTT is a well documented effective training method which addresses some of these challenges. However, implementation of DTT requires considerable training. In spite of this, the literature investigating effective training methods for how to teach persons to conduct DTT is limited. This article reviews 21 publications from 1977 up till today focusing on training methods and methods for measuring the effect of the training. Overall, it is difficult to draw conclusions of which training method that has been effective due to large variations in training packages, the duration of the training, and the use of different methods for measuring teaching skills. Implications are discussed, including suggestions for future research.

The study in article 2 investigated the effect of videoconferencing in training staff to implement discrete trials teaching in real life settings with children with autism. Fourteen participants were randomly assigned to two groups. One group received training on-site, the other group received training via videoconference. The participants received 3x15 minutes of training on three different programs; matching, receptive and expressive labeling. The results showed no significant differences between the groups in the post test whilst both groups had improved significantly following training. Although preliminary, these results suggests that videoconferencing can be an efficacious, rapid and cost-saving way to train staff in how to implement DTT.

Keywords: Discrete trials teaching, videoconference, remote training, staff training, instructing DTT, DTT components, training packages, autism spectrum disorders.

Implementering av Trenerferdigheter: En Oversikt over Anvendte Opplæringsmetoder For "Avgrensede Repetisjoner".

Running head: Opplæringsmetoder i DTT

Sammendrag

Hensikten med artikkel 1 er å gi en oversikt over den publiserte litteraturen som har undersøkt metoder for å lære personer å utøve avgrensede repetisjoner (discrete trials teaching; DTT). Autisme spekterforstyrrelser (ASF) er forbundet med komplekse læringsutfordringer. DTT er en godt dokumentert opplæringsmetode som adresserer noen av disse utfordringene. Men implementering fordrer betydelig opplæring. Til tross for dette, så er litteraturen som undersøker effektive opplæringsmetoder for å lære personer å utøve DTT begrenset. Denne artikkelen gjennomgår 21 publikasjoner fra 1977 frem til i dag med fokus på opplæringsmetoder og metoder for å måle effekten av opplæringen. Det er vanskelig å trekke konklusjoner fra hvilken av opplæringsmetodene som har vært effektiv ut fra store variasjoner i opplæringspakker, opplæringens varighet, og bruken av forskjellige måter for å måle trenerferdighetene. Implikasjoner diskuteres, inkludert forlag for fremtidig forskning.

Nøkkelord: Discrete trials teaching, avgrensede repetisjoner, DTT komponenter, opplæring, opplæringspakker, autisme, trenerferdigheter, målemetoder.

Implementering av Trenerferdigheter: En Oversikt over Anvendte Opplæringsmetoder For "Avgrensede Repetisjoner".

Autismespekterforstyrrelse (ASF) er en kompleks diagnose som er forbundet med spesielle læringsutfordringer (se eks. Newsom, 1998). Når et barn får en diagnose innen autismespekteret, vil barnets barnehage og skole få tildelt ekstra ressurser for og bedre kunne møte disse utfordringene. Gjennom flere spesialisthelsetjenester i Norge, og ved enkelte kommunale tiltak som eksempelvis Senter for tidligintervensjon i Oslo (se eks. Eikeseth et al., 2002:2007; Eldevik et al., 2011) tilbys tidlig og intensiv opplæring basert på atferdsanalyse (TIOBA). Ved TIOBA anbefales strukturert opplæring i 20-30 timer per uke (se eks Eikeseth; Eldevik et al.). Et viktig element i TIOBA er at barnets respondering og læring måles kontinuerlig, og at man basert på data kan gjøre raske justeringer i opplæringsprogrammet. Videre jobbes det systematisk med å opprettholde nylærte ferdigheter og å utvikle barnets ferdigheter ytterligere gjennom prosedyrer for generalisering (se eks. Lovaas, 1982).

En av de mest brukte metodene innen TIOBA programmer er en tilnærming hvor opplæringen foregår i form av avgrensede repetisjoner (discrete trials teaching; DTT). DTT er en ordinær tre-terms kontingens; læreren presenterer først en instruks (Sd), barnet responderer til denne instruksen (responsen), og læreren formidler deretter en konsekvens på barnets respons (Sr). DTT utføres i et relativt høyt tempo, og repetisjonene skilles av en kort pause på rundt 5 sekunder (se eks. Lovaas, 1982). I dag vet vi at barn med ASF vanligvis har behov for mange slike repetisjoner før en ny ferdighet er etablert. Når DTT brukes i opplæring, øker vanligvis barnets læringsmuligheter, noe som vanligvis også fører til at barnets læring øker (Lovaas, 2003).

TIOBA er et omfattende, kostbart og tidkrevende habiliterings- og opplæringstilbud til familier med førskolebarn med ASF, og strekker gjerne seg over en tidsperiode på ett til tre år

avhengig av barnets behov og alder ved oppstart. En viktig del av dette tilbudet er tett oppfølging og opplæring av barnets personale i barnehagen, hvor veiledningsmøter anbefales gjennomført ukentlig eller minimum annenhver uke (Smith, Donahoe, & Davis, 2001; Eikeseth, 2010). I barnehagen er det normalt hensiktsmessig og ha et opplæringsteam rundt barnet bestående av 2-5 personer for at opplæringen faktisk blir gjennomført (Eldevik et al., submitted; Green, 1996). Mange barnehager har en stor andel med ufaglært personell, og over tid erfares det også en betydelig turn-over, noe som muligens kan være forbundet med lave lønninger og et realtivt krevende arbeid (Eldevik et al. submitted). For å få gode resulater, er det helt avgjørende at barnets opplæringspersonale får tilstrekkelig veiledning og opplæring i hvordan en utfører de ulike opplæringsteknikkene og særlig DTT (Allen & Warzak, 2000; Eikeseth; Symes, Remington, Browns, & Hastings, 2006). DTT som opplæringsform er ikke en del av den tradisjonelle spesialpedagogiske utdanningen i Norge. Det eksisterer heller ingen sertifisering av TIOBA lærere eller en egen utdanning for dette i Norge (se eks. Eikeseth, 2010).

Implementering av TIOBA fordrer altså at man har ressurser og metoder for å lære opp personalet (Eikeseth, 2010; Eldevik, et al submitted). Likevel er forskningen som har undersøkt ulike metoder for lære personer å utføre DTT ganske begrenset (Sarakoff & Sturmey, 2004; Thomson, Martin, Arnal, Fazzio, & Yu, 2009).

Hensikten med denne artikkelen er å gi en oversikt over de opplæringsmetoder som til nå har vært brukt for å lære personale og implementere DTT. I tilegg vil også ulike metoder som har blitt brukt for å måle personalets ferdigheter i DTT bli gjennomgått.

METODE

Litteratursøk

Det ble utført litteratursøk i de største databasene (PsycInfo, ERIC, PubMed) med ordene "discrete trials teaching", "discrete trials opplæring", "EIBI", "staff opplæring", og "personal-opplæring", "tidlig intensiv opplæring", og "autisme". Søket ble utført både på engelsk og norsk. I tillegg gikk jeg gjennom litteraturlistene i alle relevante publikasjoner. Studiene ble inkludert etter følgende kriterier; a) fokus var å undersøke effektive metoder for opplæring av DTT, b) komponenter som var i bruk i opplæringen var beskrevet, og c) at hvilke komponenter var brukt til å måle trenerferdigheter var rapportert. Totalt ble det funnet 21 studier som møtte kriteriene for inkludering. Disse studiene var likevel ganske ulike i forhold til hvilke opplæringsmetoder og målemetoder som hadde vært brukt.

Et hovedtrekk ved disse studiene var at det hadde blitt brukt forskjellige opplæringspakker bestående av flere og varierte opplæringsmetoder. Det gis derfor først en oversikt over spekteret av opplæringsmetoder som har vært tatt i bruk.

RESULTATER OG DISKUSJON

Opplæringspakker.

Undervisning. Undervisning foregår vanligvis som forelesning, skriftlig og/eller muntlig informasjon og diskusjoner (Jahr, 1998) og utføres ofte i oppstartsfasen av en opplæringsprosess. Selvinstruksjon er en metode hvor den som skal opplæres tildeles eksempelvis en treningsmanual på DTT, hvorpå deltakeren leser denne og tilegner seg opplæringsmaterialet på egenhånd (se eks . Fazzio et al., 2009; McBride & Schwartz, 2003, Thiessen et al., 2009), eventuelt at selvinstruksjon kombineres med observasjon av filmede treningsøkter som utføres korrekt (se eks. Arco et al., 2007; Koegel et al., 1977). Ved

kursundervisning så blir opplæringsmaterialet fortrinnsvis presentert av en foreleser med god kunnskap om temaet (se eks. Bolton & Mayer, 2008; Crockett et al., 2007; Downs et al., 2008; Ryan & Hemmes, 2005) med anledning til både å få avklart ting en lurer på, samt diskusjoner. Men om undervisning som beskrevet over ikke kombineres med praktiske øvelser i en opplæringsprosess, så er det regler for treneratferd som læres. Når trenerferdigheter kun tilegnes basert på undervisning, kan dette anses som regelstyrt atferd (Mørch, 1990), men regelstyrt atferd vil ikke være lik kontingensformet atferd som er under kontroll av direkte erfaring. Uten praktiske øvelser vil ikke treneren få oppleve effekten av direkte erfaringer med DTT. En mulig ulempe ved dette er at treneratferden kan bli lite sensitiv overfor de mange kontingensene som er operative under en opplæringsøkt. (Hayes, Kohlenberg, & Melancon, 1989). Om kun denne formen for opplæring tas i bruk, er dette derfor sjeldent veldig effektivt (Jahr, 1998). Undervisning som opplæringsform inngår vanligvis som ett av flere komponenter i en opplæringspakke. Det finnes likevel et studie hvor det er demonstrert gode resultater når nylærte trenerferdigheter testes med et barn etter kun selvinstruksjon med gjennomgang av treningsmanual på egenhånd (Thiessen et al., 2009).

Tilbakemelding på utførelse av DTT. Tilbakemelding på utført trening er den metoden som er hyppigst brukt innen personalopplæring (Jahr, 1998), og er mye brukt også i studier som undersøker metoder for hvordan å lære personer å utøve DTT (se eks. Thomson et al, 2009). Tilbakemelding på utførelse kan beskrives som å gi kvantitativ eller kvalitativ informasjon på tidligere utførelse med den hensikt å endre eller opprettholde utførelse på spesifikke måter (Prue & Fairbank, 1981). Deltakeren utfører her praktiske øvelser og mottar tilbakemeldinger fra en veileder på hvordan DTT utføres. Denne metoden er også omtalt som hands-on veiledning. Tilbakemeldinger på treneratferd kan eksempelvis være spesifikke i forhold til hvordan instruksene gis eller bør gis, timing eller gradering av prompts og

konsekvenser, eller ros ved korrekt fremvist trener ferdighet. Ved praktiske øvelser in-vivo praktiserer deltakeren DTT sammen med et barn samtidig som tilbakemeldinger mottas fra veileder . Veileder er da tilstede og observerer, og gir deltakeren tilbakemeldinger på fremviste trenerferdigheter i samspill med barnet mens opplæringen pågår (se eks. LeBlanc et al, 2005; McBride & Schwartz, 2003). Tilbakemeldinger på utførelse av DTT kan også kombineres med skriftlige tilbakemeldinger (se eks Arnal et al, 2007; Ryan & Hemmes, 2005), ved at deltakeren får se resultater av egne trenerferdigheter visualisert i grafer (se eks. Lafasakis & Sturmey, 2007; Sarakoff & Sturmey, 2004), og ved en kombinasjon av både graf og skriftlig tilbakemelding (se eks. Arco, 1997). Det er også vist at personer kan lære hvordan å utføre DTT ved å kun bruke vokal feedback og ros i forbindelse med praktiske øvelser (Arco). Datasimulert opplæring med dataprogrammerte tilbakemeldinger på utførelse (DTkid) kan lære personer praktiske og teoretiske ferdigheter om DTT (Randell, Hall, Bizo & Remington, 2006), samt å utføre DTT in-vivo med barn med ASF (Eldevik et al, submitted).

Modellering. Modellering inngår ofte som ett av flere komponenter i en opplæringspakke. I rollespill modelleres opplæringsprosedyrene ofte av veileder, mens deltakeren som skal lære prosedyrene spiller barnet (se eks. Crockett et al., 2007; Fazzio et al., 2009; Ryan & Hemmes., 2005). Selv om det kanskje ikke alltid vil være like enkelt eller komfortabelt for deltakeren å spille barnet, så har rollespill den fordelen at mange repetisjoner kan gjennomføres under nærmest identiske betingelser (Jahr, 1998), samt at deltakeren også kan få egne erfaringer med hvordan det eksempelvis kan oppleves å bli håndledet. Ved modellering demonstrerer veileder korrekt bruk av prosedyrene, for så at deltakeren imiterer den modellerte prosedyren sammen med veileder, eller sammen med et barn (se eks. Fazzio et al, 2009; Ryan & Hemmes, 2005). Ved praktiske øvelser in-vivo modelleres korrekte prosedyrer av veileder underveis mens deltakeren utøver DTT med barnet (se eks. Dib &

Sturmey, 2007; Downs et al, 2008), eventuelt at veileder bytter plass med deltakeren for å demonstrere prosedyren i bruk sammen med barnet (se eks. Lafasakis & Sturmey, 2005). Det er også rapprotert om gode resultater når det kun er brukt video som opplæringsform på DTT, hvor kun film av korrekt utførte prosedyrer har vært brukt, uten at praktiske øvelser har vært en del av opplæringen (se eks. Catania et al., 2009; Crockett et al., 2007). Observasjonslæring ved bruk av video er også demonstrert som en effektiv metode for å lære personer å utføre funksjonelle analyser (se eks. Moore & Fisher, 2007), samt til å lære foreldre til barn med ASF forskjellige metoder for å intervenere med sine barn (Stahmer, Ingersoll, & Carter, 2003).

Måling av DTT

Samtlige av studiene som denne artikkelen belyser rapporterer lovende resultater. Men som vist ovenfor, så er det stor variasjon på opplæringskomponentene som er brukt. Som en følge av dette er det derfor interessant å se nærmere på hvilke metoder som har blitt brukt for å måle deltakernes DTT ferdigheter. Måling av DTT trenerferdigheter/responser har stort sett vært gjort ved at trenerresponser har blitt skåret etter DTT responsbeskrivelser, men det er også brukt selvrapportering og studiespørsmål, samt at deltakere har skåret seg selv eller andre på video ved bruk av ulike evalueringsskjema. Det gis her en punktvis gjennomgang.

Selvrapportering/spørreskjema. Som en del av den innledende opplæringsdelen i enkelte studier, så er deltakernes teoretiske kunnskap om DTT målt på deltakernes svar på spørreskjema etter endt selvstudie (se eks. Arnal et al., 2007; Salem et al., 2009; Thiessen et al., 2009), eller etter endt kurs (se eks. Crockett et al., 2007; Downs et al., 2008; Ryan & Hemmes, 2005) før praktiske øvelser med tilbakemelding har startet. Datainnsamling fra deltakernes selvskåring av egne trenerferdigheter er også brukt (se eks. Belfiore et al., 2008). Selvrapportering er også brukt etter gjennomført praktisk øvelse i form av at deltakerne først

har skåret film av DTT og skriftlig beskrevet hva de vurderte som utført feil, i tillegg til at tillit til egen utført skåre/beskrivelse ble skåret på en Likert skala (Randell et al., 2006; Eldevik et al, submitted).

DTT komponenter. Begrepet DTT komponenter viser til de forskjellige parameter som trenerferdigheter skal måles etter. DTT komponentene defineres oftest med tre-terms kontingensen som grunnlag, men med fokus på atferd hos læreren som formidling av Sd, prompts, og konsekvenser (se eks. Dib & Sturmey, 2007; Fazzio et al., 2009; Sarakoff & Sturmey, 2004;). I enkelte av skjemaene skåres også shaping av atferd (se eks Eldevik et al., submitted; Koegel et al., 1977).

Koegel, Russo & Rincover (1977) utarbeidet en av de første opplæringsmanualene for DTT, og utførte i denne studien to eksperimenter hvor et delmål var å undersøke hvorvidt manualen kunne brukes som et pålitelig og gyldig kriterium for både opplæring og måling av DTT ferdigheter. Denne manualen bestod av 13 komponenter fordelt over hovedpunkter som Sd'er, prompts, shaping, konsekvenser, samt læringsenheten (Sd-R-Sr) utført som helhet (Koegel et al.). De samme DTT komponentene ble brukt av Koegel, Glahn og Nieminen (1978) i forbindelse med både opplæring og skåring av DTT ferdigheter til foreldre med barn med ASF. I etterkant av studiene til Koegel et al., (1977) og Koegel et al., (1978) så er det utført flere studier som bruker DTT komponenter som måleinstrument på trenerferdigheter. DTT komponentene som er brukt i både treningsmanualer for selvinstruksjon, tilbakemeldinger på utførelse, og for å måle trenerferdigheter varierer imidlertid mellom ulike studier både i antall og utforming (se tabell 1 for oversikt over antall). Antall DTT responsbeskrivelser varierer for eksempel fra fire til 30. Noen av studiene bruker flere underpunkter som operasjonaliserer DTT responsbeskrivelsen i flere delresponser (Arnal et al., Eldevik et al., Koegel et al., Salem et al., 2008). Når disse delrespons-beskrivelsene

organiseres under hovedpunktene som nevnt over; Sd, prompts, shaping, konsekvenser, og læringsenheten, så fremtrer den samlede variasjonen ytterligere. Organisering og tilrettelegging av opplæringsøkten er viktig, som eksempelvis å ha opplæringsmateriale og forsterkere klart og lett tilgjengelig for treneren/læreren (se eks. Lovaas, 1982; Maurice, Green & Luce, 1996). Flere studier måler også dette som trenerferdigheter (se eks. Arnal et al., 2007; Fazzio et al., 2009; LeBlanc et al., 2005), selv om dette strengt tatt utføres forut for oppstart av opplæringen av barnet.

--- Sett inn Tabell 1 omtrent her ---

Det vil være alt for omfattende å gjennomgå responsbeskrivelsene i hvert enkelt studie her, men noe kan eksemplifiseres. Under hovedpunktet "Sd" så er noen eksempler på variasjon i målte responsbeskrivelser "verbal instruks" (Arco, 1997), "presenter instruks" (Arnal et al., 2007; Fazzio et al., 2009), og "diskriminerbar", "egnet i forhold til målet", "konsistent", "uforstyrret", "oppmerksomt barn ved presentasjon" (Eldevik et al., submitted). Ved hovedpunktet "prompts" så er noen videre eksempler på målte responsbeskrivelser "prompt" (Arco), "bruk gradert ledelse (guidance)" og "bruk korrekt prompt-delay steg" (Arnal et al.; Fazzio et al.), og "effektive", "rask/swift", og "hyppig/frequent" (Eldevik et al.). Det er også rapportert lengre beskrivelser på trenerresponsene (se eks. Dib & Sturmey, 2007; Sarakoff & Sturmey, 2004). Registrering av barnets responser i responslister er brukt som responsbeskrivelse i noen studier (se eks. Arnal et al., Fazzio et al., LeBlanc et al., 2005; Ryan & Hemmes, 2005), samt inter-trial intervall (se eks. Eldevik et al., Koegel et al.; LeBlanc et al.; Ryan & Hemmes).

Effekt av DTT-opplæringen. Det er noe uenighet i litteraturen om hvorvidt endring i responser også skal måles hos barnet når personer skal lære hvordan å utføre DTT. Deler av litteraturen vektlegger at funksjonelle relasjoner mellom trenerresponser og barnets responser identifiseres (se eks. Ingham & Greer, 1992; Koegel et al, 1977), videre påpekes viktigheten av at det undersøkes i hvilken grad de forbedrede trenerferdighetene fører til forbedret læring hos barnet (Downs et al., 2008; Eikeseth, 2010; Jahr, 1998). Det er demonstrert at barnets læring øker når lærerens DTT ferdigheter forbedres (se eks. Koegel et al.). Likevel, om barnets læring ikke øker signifikant så er det samtidig viktig å understreke at dette ikke nødvendigvis trenger å være forbundet med lærerens trenerferdigheter (Crocket et al., 2007). Noen ganger vil det kanskje ikke være til å unngå at barnets læring viser en relativt lav progresjon. Barnets forutsetninger kan eksempelvis være av en slik karakter at selv svært raffinerte trenerferdigheter ikke får barnets læring opp i signifikant fremgang. Dette endrer ikke argumentasjonen i forhold til at det kan være gunstig å skåre trenerresponser i relasjon til barnets responser som beskrevet over, men i lys av dette vil kanskje barnets grad av læring i noen tilfeller være et mindre egnet måleinstrument på en lærers trenerferdigheter. Uansett, litteraturen fremstår samlet om viktigheten av høy kvalitet på lærerens trenerferdigheter for å sikre barnets opplæring innenfor DTT (se eks. Allen & Warzak, 2000; Eikeseth, 2010; Eldevik et al, submitted; Lovaas, 1982; Symes, Remington, Browns, & Hastings, 2006).

Skåring av barnets responser. Når skåring av DTT trenerresponser skal utføres, så kan dette eksempelvis gjøres in-vivo ved at en skårer er tilstede når testbetingelsen utføres (se eks. Downs et al., 2008; LeBlanc et al., 2005) , eller at testbetingelsen filmes for at skåring kan utføres ved observasjon av film i etterkant (se eks. Arnal et al., 2007; Dib & Sturmey, 2007; Lafasakis & Sturmey, 2007). Det at deltakerens trenerresponser skåres i relasjon til barnets responser kan være svært nyttig når det er behov for at DTT trenerferdigheter skal skåres

presist. Dette kan gjøres ved å først skåre ut alle barnets responser i gjeldende testbetingelse som "korrekt", "feil" eller "promptet", for så at deltakerens DTT trener responser skåres i relasjon til den enkelte respons fra barnet, eller at barnets og deltakerens trenerresponser skåres i relasjon til hverandre for den enkelte suksessive læringsenhet. Denne skåringsmetoden gir mulighet for skåring av både rate og presisjon av DTT trenerresponser i relasjon til barnets responser (Ingham & Greer, 1992; Selinske, Greer, & Lohdi, 1991). Flere studier rapporterer om lignende skåring (se eks. Arnal et al.; Downs et al., 2008; Eldevik et al., submitted; Koegel et al., 1977; Lafasakis & Sturmey), mens det i andre studier ikke er rapportert hvorvidt skåring av barnets responser er utført (se eks. LeBlanc et al.; Ryan & Hemmes, 2005).

Generalisering.

Både stimulusgeneralisering og responsgeneralisering er viktige egenskaper ved DTT trenerferdigheter. For eksempel, så er det viktig å være i stand til å mestre trenerferdighetene sammen med forskjellige barn. Men det er også viktig å kunne generalisere trenerferdighetene til andre opplæringsprogram, ettersom læreren med stor sannsynlighet vil bli presentert for et økende og stort utvalg av programmer som skal jobbes med etter hvert som barnet lærer (Koegel et al., 1978). Flere studier har demonstrert stimulusgeneralisering og responsgeneralisering av nylærte DTT trenerferdigheter i forskjellige arrangement; generalisering fra rollespill til opplæring av barn med ASF (se eks. Fazzio et al., 2009; Ryan & Hemmes, 2005), generalisering til andre opplæringsprogram (se eks Catania et al., 2009; Koegel et al., 1978;), generalisering til andre barn og oppgaver (se eks. Downs et al., 2008; Koegel et al., 1977), generalisering av trenerferdigheter fra elektronisk opplæring (DTkid) til implementering med et barn med ASF (Eldevik et al., submitted), samt generalisering fra selvinstruksjon ved å ha lest en treningsmanual til å utføre DTT med et barn med ASF

(Thiessen et al., 2009). Selv om barnets lærer fremviser trenerferdigheter med høy kvalitet, og videre at barnets læring forbedres signifikant, er det ikke en selvfølge at disse trenerferdighetene generaliseres til andre barn eller opplæringsmål spontant (se eks. Lovaas, 1982) Det vil derfor være viktig å identifisere effektive opplæringsmetoder også bidrar til generalisering.

Et annet viktig aspekt her er i hvilken grad trenerferdighetene generaliseres over tid. Dette er mer generelt omtalt som opprettholdelse av trenerferdigheter. TIOBA med DTT er et langvarig opplærings- og veiledningsforløp, og ikke alt personale har jevnlig og hyppig tilgang til veileding fra spesialister. Generalisering av trenerferdigheter over tid er derfor spesielt viktig å undersøke for å sikre at en effektiv implementering av DTT vedvarer (se eks. Lovaas, 1982). Kun tre av studiene inkludert her var designet for å undersøke opprettholdelse av trenerferdigheter og da etter veldig varierende tid; etter 1 uke (Catania et al., 2009), frem til 10 uker (etter baseline) (Downs et al., 2008), og frem til 11 uker (etter posttest) (LeBlanc et al., 2005). Dette understreker et behov for videre forskning for å se om ferdighetene opprettholdes, samt for å se om enkelte metoder gir bedre opprettholdelse enn andre.

Validitet.

Samtlige av studiene rapporterer lovende resultater på metodene som er brukt for å lære personer å utføre DTT. I de 14 studiene som rapporterer inter-rater reliabilitet (IRR), er denne tilfredsstillende (range 85%-98%). Noen punkter vedrørende validitet bør likevel nevnes. Forskjellige opplæringspakker bestående av forskjellige opplæringsmetoder er brukt i de forskjellige studiene som er gjennomgått her, og det er ikke utført komponentanalyser av den enkelte opplæringspakke. En forklaring på dette kan kanskje være at en suksessiv utført komponentanalyse ville hatt implikasjoner i forhold til interne validitetsvariabler som historikk og modning. Noe av opplæringen i forrige komponent, eksempelvis teoretisk

kunnskap tilegnet på kurs, vil nødvendigvis kunne ha innflytelse på hva deltakeren lærer under neste komponent, eksempelvis praktiske øvelser med feedback. En komponentanalyse etter praktiske øvelser med feedback ville da måle effekten fra begge opplæringskomponentene samlet, ikke bare fra den siste komponenten. I tillegg varierer selve varigheten på opplæringen mye på tvers av studiene, fra 2x10 min til ca 35 timer . Dette gjør at det er vanskelig å trekke slutninger om hvilket av de forskjellige opplæringskomponentene som har bidratt til opplæringseffekten i de ulike studiene. De forskjellige studiene har videre tatt i bruk forskjellig antall DTT komponenter med ulik operasjonalisering av DTT. Dette kan by på utfordringer relatert til begrepsvaliditet ettersom det vil være vanskelig å vite nøyaktig hvilken atferd hos deltakeren som er målt. Dette vil i sin tur gjøre det vanskelig å replikere studien (Kazdin, 2003; Shadish, Cook & Campbell, 2002).

Det kan imidlertid bemerkes at ett sett med DTT komponenter har blir brukt i flere studier. I 2006 utarbeidet Fazzio og Martin en 21 siders opplæringsmanual som inneholdt 19 DTT komponenter, men denne er så langt ikke publisert. Disse 19 komponentene har blitt brukt på tvers av fem studier for å undersøke effekten av selvinstruksjon som opplæringsmetode. I 2007 ble det lagt til ytterligere to DTT komponenter, og et skåringsskjema ble utarbeidet og publisert (Discrete-trials teaching evaluation form;DTTEF, Salem et al., 2008). To studier er utført hvor de 19 DTT komponentene er brukt for å undersøke selvinstruksjon som opplæringsmetode (Arnal et al., 2007; Fazzio et al., 2009), og tre studier er utført hvor den reviderte utgaven med 21 punkter er brukt (Babel, Martin, Fazzio, Arnal & Thomson, 2008; Salem et al., 2008; Thiessen et al., 2009). Tre av disse studiene rapporterte stimulus- og responsgeneralisering fra selvinstruksjon (inkludert late-som-imitasjon fra video) til in-vivo opplæring med barn med autisme (Fazzio et al., Salem et al.; Thiessen et al.). En valideringsstudie av DTTEF (Babel et al.) rapporterer gode resultater

på skjemaets validitet (face validity). Likevel er det behov for videre undersøkelser da det kun var tre deltakere som evaluerte skjemaet, samt at in-vivo skåring ble utført ved bruk av personer som rollespilte barn med ASF.

Eldevik et al. (submitted) har nylig utarbeidet et skåringsskjema, the Evaluation of Therapeutic Effectiveness Scoring Sheet (ETE). Dette skåringsskjemaet inneholder 22 DTT komponenter, men er foreløpig ikke standardisert eller validert (Eldevik et al. submitted). Hovedforskjellen mellom DTTEF og ETE er at 1) ETE har skåringstabell for både barnets responser (korrekte, feile og promptede) og for trenerferdigheter. ETE gir derfor mulighet for at trenerens atferd kan skåres suksessivt i relasjon til barnets responser, og som nevnt tidligere så vil en da kunne få registrert både rate og nøyaktighet samtidig som funksjonelle relasjoner kan identifiseres (Ingham & Greer, 1992; Selinske, Greer, & Lohdi, 1991). 2) I DTTEF vektlegges også organisering og tilrettelegging av opplæringsøkten, mens det i ETE er vektlagt flere operasjonaliseringer av selve opplæringen.

OPPSUMMERING

Det er vanskelig å trekke slutninger på tvers av studiene siden det er stor variasjon i opplæringens varighet, hvilke og antall opplæringsmetoder som har blitt brukt, samt i hvordan effekten av opplæringen har blitt målt. Videre er det stor variasjon i antall DTT komponenter som er brukt som avhengig variabel i de forskjellige studiene, samt at nivå på operasjonalisering i flere av studiene gjør det vanskelig å identifisere akkurat hvilke responser som er målt hos deltakerne. Det vil derfor være behov for videre forskning som retter seg mot disse begrensningene. Det er likevel positivt at forskere i feltet har begynt en mer systematisk bruk av samme DTT skåringskjema. Validering av både DTTEF og ETE vil være nyttige

bidrag til videre forskning som undersøker opplæringsmetoder for implementering av DTT trenerferdigheter, og for å måle effekten av denne opplæringen. Det å kunne skåre funksjonelle relasjoner mellom læreren og barnet vil også kunne være nyttig i forbindelse med opplæring og veiledning av opplæringspersonale. Videre vil skjema med validerte DTT komponenter kunne være nyttige som mal for veiledere i forbindelse med opplæring og veiledning av ute i barnehager og skoler.

Som nevnt innledningsvis så er TIOBA et omfattende, kostbart og langvarig veilednings- og oppfølgingsforløp med en hyppig oppfølgingsfrekvens. Et av hovedpunktene som generelt etterspørres i den foreliggende litteraturen er at det bør etterstrebes å identifisere virkningsfulle, effektive og kostnadsreduserende opplæringsmetoder for å implementere DTT. Dette er ikke bare viktig for arbeidsgivere og for spesialistene som veileder ute i 1. linjetjenesten. Til syvende og sist så er det opplæringspersonalet som skal tilegne seg kunnskapen og ferdighetene, og som skal implementerer DTT i hverdagen. Fremtidig forskning bør derfor tilstrebe å undersøke generalisering av trenerferdigheter over tid, for at opplæringsmetoder som fremmer dette skal kunne identifiseres. Det at trenerferdigheter måles jevnlig i et lengre oppfølgingsløp kan muligens også ha en motiverende funksjon for opplæringspersonalet. Videre har spesialisthelsetjenesten klare krav om produksjon, og måling av trenerferdigheter vil her kunne bidra som dokumentasjon på kompetanseoverføring til 1. linjetjenesten.

Spesialisthelsetjenestene dekker store geografiske områder, og spesialistene her bruker ofte mye tid i bil for å kunne følge opp den enkelte TIOBA sak lokalt. Dagens teknologiske verden kan muligens by på potensielle alternativ til supplerende løsninger for implementering av DTT trenerferdigheter, samt til supplerende måter som veiledning av opplæringspersonale til barn med ASF kan utføres i forbindelse med TIOBA tilbud. I andre fagfelt innenfor

helseområdet er videokonferanse i utstrakt bruk både internasjonalt og i Norge (Augestad & Linsetmo, 2009; Bach et al., 2010). Det har også blitt utført noen få studier innenfor feltet til anvendt atferdsanalyse hvor det er undersøkt bruk av videokonferanse i forbindelse med preferansekartlegging (Machalicek et al., 2009b), funksjonelle analyser (Machalicek et al., 2009a), samt for å lære personer å implementere ESDM (Vismara, Young, Stahmer, Griffith, & Rogers, 2009). Samtlige av disse studiene har vist lovende resultater. Et forslag for videre forskning er derfor også å undersøke effekten av opplæring ved bruk av videokonferanse når DTT skal læres. Om bruk av videokonferanse kan gi tilsvarende effekt som tradisjonell opplæring og veiledning on-site, så kan dette kanskje være et supplerende format på opplæring og veiledning som kan bidra til både effektivitet og kostnadsreduksjon i forbindelse med implementering av DTT.

REFERANSER

Allen, K., D., & Warzak, W., J. (2000). The problem of parental nonadherence in clinical behavior analysis: effective treatment is not enough. *Journal of applied behavior analsysis, 33*, 373-391.

Arco, L. (1997). Improving program outcome with process-based performance feedback. *Journal of organiztional behavior management, 17*, 37-64.

Arnal, L., Fazzio, D., Martin, G., Yu, C., T., Keilback, L., & Starke, M. (2007). Instructing university students to conduct discrete trials teaching with confederates simulating children with autism. *Developmental disabilities bullentin, 35*, 131-147.

Augestad, K. M., & Lindsetmo, R. O. (2009). Overcoming distance: video-conferencing as a clinical and educational tool among surgeons. *World journal of surgery, 33*, 1356-1365.

Babel, D., A., Martin, G., L., Fazzio, D., Arnal, L., & Thomson, K. (2008). Assessment of the reliability and validity of the discrete-trials teaching evaluation form. *Developmental disabilities bullentin, 36*, 67-80.

Bach, B., Sørli, H., & Driveklepp, A., M. (2010). *Telemedisin i rehabilitering - Bruk av IKT i pasientoppfølging (English summary)* (Rapport No. 06-2010). Tromsø: Nasjonalt senter for samhandling og telemedisin.

Belfiore, P., J., Fritts, K., M., & Herman, B., C. (2008). Using self-monitoring to enhance discrete trial instruction. *Focus on autism and other developmental disabilities, 23*, 95-102.

Bolton, J., Mayer, M., D. (2008). Promoting the generalization of paraprofessional discrete trial teaching skills. *Focus on autism and other developmental disabilities, 23*, 103-111.

Catania, C., N., Almedia, D., Liu-Constant, B., & Reed, F., D., D. (2009). Video modeling to train staff to implement discrete-trial instruction. *Journal of applied behavior analsysis, 42*(387-392).

Crockett, J., L., Fleming, R., K., Doepke, K., J., & Stevens, J., S. (2007). Parent training: Acquisition and generalization of discrete-trials teaching skills with parents of children with autism. *Research in developmental disabilities, 28*, 23-36.

Dib, N., & Sturmey, P. (2007). Reducing student stereotpy by improving teachers' implementation of discrete-trial teaching. *2007, 40*, 339-343.

Downs, A., Downs, R., C., & Rau, K. (2008). Effects of training and feedback on discrete trial teaching skills and student performance. *Research in developmental disabilities, 29*(235-246).

Eikeseth, S. (2010). Examination of qualifications required of an EIBI professional. *European journal of behavior analysis, 11*, 239-246.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4- to 7-year-old children with autism: a 1-year comparison controlled study. *Behavior modification, 26*, 49-68.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2007). Outcome for Children with Autism who Began Intensive Behavioral Treatment Between Ages 4 and 7: A Comparison Controlled Study. *Behavior modification, 31*, 264-278.

Eldevik, S., Hastings, R., P., Jahr, E., Hughes, J., C. (2011). Outcomes of behavioral intervention for children with autism in mainstream pre-school settings. *Journal of autism and developmental disorders,* (07 April 2011). doi:10.1007/s10803-011-1234-9

Eldevik, S., Ondire, I., Hughes, J., C., Grindle, C., Randell, T., & Remington, B. (submitted). Effects of computer simulation training on real life dicrete trial teaching.

Fazzio, D., Martin, G.L., Arnal, L., & Yu, D. C. T. (2009). Instructing university students to conduct discrete trials teaching with children with autism. *Research in autism spectrum disorders, 3,* 57-66.

Green, G. (1996). Early behavioral intervention for autism: what does research tell us? In C. Maurice, Green, G., & Luce, S. (Ed.), *Behavioral intervention for young children with autism: a manual for parents and professionals*. Austin, Texas: PRO-ED inc.

Hayes, S., C., Kohlenberg, B., S., & Melancon, S., M. (1989). Avoiding and altering rule-control as a strategy of clinical intervention. In S. Hayes, C. (Ed.), *Rule-governed behavior: cognintion, contingencies and instructional control* (pp. 359-384). New York: Plenum Press.

Ingham, P. G., R., D. (1992). Changes in student and teacher responses in observed and generalized settings as a function of supervisor observation. *Journal of applied behavior analysis, 25*, 153-164.

Jahr, E. (1998). Current issues in staff training. *Research in developmental disabilities, 19*, 73-87.

Kazdin, A. E. (Ed.). (2003). *Research design in clinical psychology* (4 ed.). Boston, MA: Allyn & Bacon.

Koegel, R. L., Glahn, T., J., & Nieminen, G., S. (1978). Generalization of parent-training results. *Journal of applied behavior analsysis, 11*, 95-109.

Koegel, R. L., Russo, D. C., & Rincover, A. (1977). Assessing and training teachers in the generalized use of behavior modification with autistic children. *Journal of Applied Behavior Analysis, 10*, 197-205.

Lafasakis, M., & Sturmey, P. (2009). Training parent implementation of discrete-trial teaching: Effects on generalization of parent teaching and child correct responding. *Journal of applied behavior analsysis, 40*, 685-689.

LeBlanc, M., P., Ricciardi, J., N., Luiselli, J., K. (2005). Improving discrete trial instruction by paraprofessional staff through abbreviated performance feedback. *Education and treatment of children, 28*, 76-82.

Lovaas, O., & Smith, T. (2003). Early and intensive behavioral intervention in autism. In A. Kazdin, E. & Weisz (Ed.), *Evidence-based psychotherapies for children and adolecents* (pp. 325-340). New york: NY: Guilford Press.

Lovaas, O., I. (1982). *Teaching individuals with developmental delays: basic intervention techniques* Austin, Texas: Pro ed

Machalicek, W., O'Reilly, M., Chan, J., M., Lang, R., Rispoli, M., Davis, T., Shogren, K., Sigafoos, J., Lancioni, G., Antonucci, M., Langthorne, P., Andrews, A., & Didden, R. (2009). Using videoconferencing to conduct functional analysis of challenging behavior and develop classroom behavioral supprt plans for students with autism. *Education and training in developmental disabilities, 44*, 207-217.

Machalicek, W., O'Reilly, M., Chan, J., M., Rispoli, M., Lang, R., Davis, T., Shogren, K., Sorrels, A., Lancioni, G., Sigafoos, J., Green, V., & Langthorne, P. (2009). Using videoconferencing to suppert teachers to conduct preference assessments with students with autism and developmental disabilities. *Research in autism spectrum disorders, 3*, 32-41.

Maurice, C., Green, G., & Luce, S. (1996). *Behavioral intervention for young children with autism: a manual for parents and professionals*. Austin, Texas: PRO-ED inc.

McBride, B., J., & Schwartz, I., S. (2003). Effects of teaching early interventionists to use discrete trials during ongoing classroom activities. *Topics in early childhood special education, 23*, 5-17.

Moore, J., W., & Fisher, W., W. (2007). The effects of videotape modeling on staff acquisition of functional analysis methodology. *Journal of applied behavior analysis, 40*, 197-202.

Mørch, W. T. (2003). Betraktninger om etikk. In F. Svartdal, & Eikeseth, S. (Ed.), *Anvendt atferdsanalyse* (pp. 179-206). Oslo: Gyldendal Akademika.

Newsom, C., B. (1998). Autistic disorder. In E. Mash, J., & Barkley, R., A. (Ed.), *Treatment of childhood disorders* (pp. 416-467). New York: Guilford.

Prue, D., M., & Fairbank, J., A. (1981). Performance feedback in organizational behavior management: a review. *Journal of organizational behavior management, 3*, 1-16.

Randell, T., Hall, M., & Lewis, B. (2006). DTkid: Interactive simulation software for training tutors of children with autism. *Journal of autism and developmental disorders, 37*, 637-647.

Ryan, C. S., & Hemmes, N. S. (2005). Post-discrete-trial teaching performance by instructors of young children with autism in early intensive behavioral intervention. *The behavior analyst today, 6*(1), 1-12.

Salem, S., Fazzio, D., Arnal, L., Fregeau, P., Thomson, K., Martin, G., L., & Yu, C., T. (2009). A selv-instructional package for teaching university students to conduct discrete-trials teaching with children with autism. *Journal of developmental disabilities, 15*, 21-29.

Sarakoff, R., A., & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trials teaching. *Journal of applied behavior analsysis, 37*, 535-538.

Selinske, J., Greer, R., D., Lohdi, S. (1991). A functional analysis of comprehencive application of behavior analysis to schooling. *Journal of applied behavior analysis, 24*, 107-117.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Expermimental and quasiexperimental designs for generalized causal inference*. Boston, New York: Houghton Mifflin Company.

Smith, T., Donahoe, P., A., & Davis, B., J. (2001). The UCLA Young Autism Project. In J. Handleman, S., & Harris, S., L. (Ed.), *Preschool Education Programs for Children with Autism* (2 ed., pp. 29-48). Austin, Texas: Pro-ed.

Stahmer, A., C., Ingersoll, B., & Carter, C. (2003). Behavior approaches to promoting play. *Sage publications and the national autistic society, 7*, 401-413.

Symes, M., D., Remington, B., Browns, T., & Hastings, R., P. (2006). Early intensive behavioral intervention for children with autism: therapists perspectives on achieving procedural fidelity. *Research in developmental disabilities, 27*(30-42).

Thiessen, C., Fazzio, D., Arnal, L., Martin, G., L., Yu, D.,C., T., & Kielback, L. (2009). Evaluation of a self-instrucional manual for conducting discrete-trials teaching with children with autism. *Behavior modification, 33*, 360-373.

Thomson, K., Martin, G., L., Anral, L., Fazzio, D., & Yu, C., T. (2009). Instructing individuals to deliver discrete trials-teaching to children with autism spectrum disorders: a review. *Research in autism spectrum disorders, 3*, 590-606.

Vismara, L. A., Young, G.S., Stahmer, A.C., Griffith, E.M., & Rogers, S. J. (2009). Dissemintaion of evidence-based practice: can we train therapists from a distance? *Journal of autism and developmental disorders, 39*, 1636-1651.

Remote Staff Training: The Effect of Training Discrete Trials Teaching Skills using Videoconference

Running head: (Opplæringsmetoder i DTT)

Abstract

This study investigated the effect of videoconferencing in training staff to implement discrete trials teaching in real life settings with children with autism. Fourteen participants were randomly assigned to two groups. One group received training on-site, the other group received training via videoconference. The participants received 3x15 minutes of training onthree different programs; matching, receptive and expressive labeling. The results showed no significant differences between the groups in the post test whilst both groups had improved significantly following training. Although preliminary, these results suggests that videoconferencing can be an efficacious, rapid and cost-saving way to train staff in how to implement DTT.

Keywords: Discrete trials teaching, videoconference, remote training, staff training, autism.

Remote Staff Training: The Effect of Training Discrete Trials Teaching Skills using Videoconference

Early intensive behavior intervention (EIBI) is offered as a service in some specialist health services in Norway. These services are typically offered to families with children diagnosed with autism specter disorders (ASD) in pre-school age and provided in the child's pre-school (Eikeseth, Smith, Jahr & Eldevik, 2002:2007; Eldevik, Hastings, Jahr, & Hughes, 2011). One of the key teaching methods within EIBI is discrete trials teaching (DTT). DTT has been shown to be an efficient approach for teaching children with ASD new and difficult skills in important areas such as language, social and academic skills (Leaf & McEachin, 1999; Lovaas & Smith, 2003; Smith, 2001; Sturmey & Fitzer, 2007). DTT consists of a series of discrete learning units. When teaching a new skill, the skill is broken down into smaller more manageable steps, that could more easily be taught. DTT is based on a three-term contingency; the presentation of a distinct defined instruction from the teacher (the discriminative stimulus), the child's response to this instruction (the response), and then the teachers consequence to the child's response (the reinforcer) (e.g., Lovaas, 1982). Each trial should be separated by a inter-trial interval of about 5 seconds. In this way many trials can be conducted over a short period of time, and this usually leads to an increase in the child's learning.

However, the efficiency of DTT can be reduced significantly if the teachers is not properly trained and/or supervised (Allen & Warzak, 2000; Eikeseth, 2010; Symes, Remington, Browns, & Hastings, 2006). In spite of this and the fact that the proper implementation of a comprehensive early intervention program requires training of a large number of therapists, the literature investigating methods on how to most efficiently train staff and parents to implement DTT is rather limited (Sarokoff & Sturmey, 2004; Thompson, Martin, Arnal, Fazzio, & Yu, 2009).

When EIBI is requested from the specialist health services in Norway, this is usually granted regardless of location and driving distances. The proper implantation of EIBI normally requires close supervision. It is recommended that team meeting are conducted every week, or at least every second week (Smith, Donahoe, & Davis, 2001; Eikeseth, 2010). Norway is a country with low population density and often long travel distances even within the catchment area of a service provider, resulting in considerable amount of travel time if cases are to be followed up locally. Time used for travelling could be reduced if supervision and training could be done using videoconference equipment.

Videoconferencing is increasingly used in health services, and the quality of sound and picture has increased while the costs for setting it up have dropped. Videoconferencing is widely used today within healthcare, i.e., in surgical telementoring, trauma and acute medicine, post-operative follow-up of patients, multidisciplinary evaluations of patients and in education (Augestad & Lindsetmo, 2009). Videoconferencing is also used in psychotherapy and training of psychotherapists (Gammon, Bergvik, Bergmo, & Pedersen, 1996; Sorlie, Gammon, Bergvik, & Sexton, 1999), psychiatric assessments (Elford et al., 2000; Zarate, Weinstock & Baer, 1997), and follow-up of patients discharged from hospital (Tousignant, Boissy, Corriveau, & Moffet, 2006). Videoconferencing through the Norwegian Health Network is also in extensive use within healthcare and rehabilitation in Norway and the National centres use videoconferencing for admissions, discharges, follow-up after rehabilitation periods, and multidisciplinary team evaluations (Augestad & Lindsetmo, 2009; Bach et al., 2009). The Norwegian Health Network (NHN) provides a nation-wide network connecting hospitals and other health care providers an encrypted electronic network, enabling a secure exchange of sensitive patient information (http://nhn.no/om-oss).

The cost effectiveness of videoconferencing have been investigated with patients with diabetes. It was reported that videoconferencing maintained quality of care while producing

cost savings (Verhoeven et al., 2007). Morrison, Bergauer, Jacques, Coleman, & Stanziano (2001) consulted and monitored women that had been diagnosed with preterm labor. The results suggests that videoconferencing might be a cost-effective method for frequent monitoring and consultation, as the videoconference group was approximately one third of the cost of the control group.

The author was not able to obtain any literature on the use of videoconferencing for training staff to implement DTT. However, some papers evaluating the use of videoconference within early intervention for children with ASD and applied behavior analysis were found. Barretto, Wacker, Harding, Lee, & Berg (2006) investigated the use of videoconferencing while conducting short functional analysis on two children. Both children had been referred to the clinic at the Biobehavioral Service (BBS) at the University of Iowa for evaluation of severe behavior problems. The supervising clinicians were situated in a telemedicine studio (host site) at the clinic, and the evaluations were conducted by the children's primary caretakers in studios situated at the remote sites. One remote site at the child's local elementary school was connected to the host site during the assessment of one of the children. During the assessment of the second child, two remote sites were connected to the host site, one site situated at the child's school and the other situated at a local service office. The functional analysis was based on the procedures described in Iwata, Dorsey, Slifer, Bauman, & Richman, (1982:1994) and Northup et al., (1991) and was evaluated within a multiple element design. The children's primary care providers, novices to conducting functional analysis, carried out the sessions at the remote site. Data collection was done at the host site by the supervisors during the videoconference, and the primary caretakers at the remote site received guidance on how to conduct the functional analysis. The experimenters concluded that it was possible to conduct a successful functional analysis with the use of videoconference. They also describe a project at BBS where 75 videoconference consultations

were conducted with the same analytic methods as used in the study, and as many as 200 videoconference consultations were conducted, mainly being descriptive assessments and initial screenings. They conclude that videoconferencing used by an experienced behavior analysts can be an efficient method for conducting brief functional analysis, follow-up consultations, and descriptive screenings to assess severe behavior disorders.

Machalicek et al. (2009a) did a two-phased study using videoconference from laptop to laptop while supervising novice teachers how to conduct functional analysis on two children with ASD. Confidentiality of the broadcast was obtained using a 128-bit encrypted line. In the first phase of the study functional analysis was conducted at the children's local schools. The children and teachers were in the child's classroom, and the observers were in a different room at the same school from where they carried out their observations, registrations and supervision of therapists conducting the analysis. In the second phase of the study they initiated interventions based on the results from the functional analysis in the first phase. The results showed that it was possible to both collect reliable data via videoconference, and to develop efficient interventions based on the results from these analyses.

Machalicek et al., (2009b) conducted a study in two phases training three novice graduate students to carry out preference assessments with three students with ASD and developmental disabilities through videoconferences. The videoconference was broadcasted on a wireless connection from laptop to desktop with the data transmission secured through an Internet network with 128-bit encryption. The laptop was located at the remote school-premises (remote site) with the participants and the students, and the desktop was placed at the university (host site) where the supervisors were located. In the first phase the participants were taught to carry out preference assessments, and the supervisors instructed them when to, and with which items to start. Data collection on both the participants and the students were done by the supervisors during the videoconference, and the participants received feedback

immediately on their performance during the sessions. In the second phase of the study videoconferencing was not used. While the participants implemented an instructional intervention for the students based on the results from preference assessments, they now received guidance from the supervisors attending on-site. The results showed that it was possible to collect reliable data using videoconference on preference assessments and to give immediate feedback on procedures. In the second phase, it was demonstrated that the items selected from the preference assessments in the first phase were preferred over other items, and did function as reinforcers for task demands.

Vismara, Young, Stahmer, Griffith, & Rogers, (2009) conducted a quasi-experimental study to compare training using video links with traditional instruction while teaching local therapists to implement the Early Start Denver Model (ESDM). Ten participants received training in two phases, each lasting for 5 months. Each training phase consisted of self-instruction on the ESDM manual, a didactic workshop and group supervision. The first phase addressed direct 1:1 intervention with children with ASD while using the ESDM. The second phase addressed the implementation of a parent coaching model. The participants were divided in two groups, where one group received supervision via videoconferencing, and the other group received training with the supervisor attending on-site. The training conditions were given to the participants sequentially within the same period of time. The results showed no significant differences between the groups, but revealed significant effects from the interventions for both groups.

In addition to reducing time consuming traveling and costs related to EIBI for both the families and the specialist healthcare services, the use of videoconferencing could also provide a more immediate access to specialists for the local service providers and the parents to children with ASD in rural areas. Additionally, videoconferencing provides for opportunities to counseling and evaluations from several specialists simultaneously, although

being situated at different places in the country, or in the world for that matter. As such, videoconferencing may represent a viable option for efficient, rapid and economical ways to train and supervise local primary caretakers of children with ASD and their families in several ways.

Based on these issues and positive findings, the author (experimenter) wanted to investigate whether videoconferencing could be used to train staff to implement discrete trials teaching with children with ASD.

METHOD

Participants

First, a request for participation in the research study was sent out to two schools and three pre-schools in a county in the east of Norway. One special school and one pre-school agreed to participate. The directors at the respective sites recruited the participants from their staff. All together sixteen participants were requited, 13 from the special school and three from the pre-school. The participants and the children's parents gave their written informed consent for participation in accordance with the guidelines of the Regional Ethical Research Committee.

The average age of the participants was 42.5 years (range 24-64), three male and 13 females. One participant withdrew from the study due to illness. Two of the participants reported to have some prior experience with DTT and one reported to have some knowledge of the method, but no experience in using it. Any participant scoring above 80% in the pretest measuring discrete trial teaching skills was excluded from the study, as this would indicate close to mastery of the skills targeted for training. The formal education of the participants

differed; eight of the participants had a minimum of three years at a university college (teacher, social educator, occupational therapist). Five had minimum three years at a high school majoring in health and social care, and two of the participants had no formal education beyond elementary school. All participants had a minimum of three years of experience working with children with special needs.

Six children between the age of 5 and 14 years (mean 9.3 years) were recruited for the participants to work with during the testing, supervision and training. Four of the children were diagnosed with autistic disorder and moderate developmental disability. The remaining two children were diagnosed with moderate developmental disability. One of these two children was excluded from the study after one session due to recurrence of severe challenging behaviors. One of the children moved to a different part of the country during the summer vacation, so that seven of the participants had to carry out their follow-up test with a different child than in the previous test conditions.

Apparatus

During supervision via the videolink, the experimenter was located in a videoconferencing-studio at the specialist health services, Habiliteringsavdelingen, Vestre Viken HF. This studio is referred to as the host site, and the remote training sites at the school and pre-school are referred to as the remote sites.

The host site was equipped with a Tandberg C60 video unit with the options Premium Resolution and Natural Presenter Package (NPP). This package contained a camera with 1920x1080 pixels progressive resolution, with 60 frames per second, 12 x zoom and a microphone. The unit had two remote controls, one for the unit and one for the camera. The unit had CD sound quality. Maximum bandwidth was 6 Mbps point-to-point. The unit was set to 3Mbps enabling full high definition (Full HD) picture quality. The network (100 Mb full

duplex) was connected directly to the NHN through Habiliteringsavdelingen's LAN, and the systems at all three sites were configured as endpoints.

The network line was configured so that it could only be used for traffic transferring video. Data transmission was via a 256-bits encrypted line on the NHN. The C60 has the possibility to use several sources at the same time to compose layout of the video-streams, and it can combine three sources; two cameras and a PC presentation. Only one camera was used in the host site in this study. The host site had two Samsung 46" screens (LH46MGPLBC/EN) with 1920x1080 pixels resolution and built-in speakers, but only one screen was used in this study.

At the remote sites it was used a Toshiba laptop with a Dual-Core CPU (T4500 @2.30GHz 2.30GHz)6 Gb RAM and Windows7 Home Premium 64 bits operating system with a 3.3 Windows experience index. The experimenter had two accounts from the NHN to be used with a Movi^{TM}-client. Movi^{TM} version 4.1 was installed on the laptop and the screensaver was deactivated to avoid the screen switching off during the broadcasting. An external web-camera (Phillips SPC530NC/00 with VGA CMOS and 1,3M pixels resolution, with 30 frames per second, 3x digital zoom and face-tracking) was connected to the laptop. The camera could be rotated and had a built-in digital microphone with noise-reduction. Two external speakers with 2W output was also attached to the laptop. The laptop was connected to the NHN via the guest network which was reported to have 1Gb speed to main switch, and 100Mb out to the cabled network points. The site at the pre-school had a cabled connection to the Internet, but at the school site there was only wireless connection available. The wireless network was reported to be 54Mb. In addition to the web-camera all sessions were filmed using a video-camera (Samsung SMX-F40BP/EDC) with a tripod. The experimenter had also made a short instruction manual for how to use the video-camera and log on to Movi^{TM}. A mobile phone was placed in each site in case of technical problems.

The experimenter had different items available while conducting the training; 1) a script describing the test phases stating the duration of each phase and the teaching programs the participant was going to do (see appendix A), 2) a script describing the intervention phase and the DTT approach (see appendix B), 3) a form to keep track of the different programs the participants and children worked on in the different conditions. The programs were determined by the experimenter prior to each session, and if need be updated during the session to ensure that the teacher always was tested when teaching a new task to the child. The form also contained the main DTT procedures in keywords. (see Appendix C). 4) The Evaluation of Therapeutic Effectiveness scoring sheet (ETE) (see Appendix D), 5) a timer to time the duration of the different conditions, 6) a pen and paper for notes, and 7) a folder with teaching materials.

Target selection

Before the study started the experimenter had meetings with the child's teacher. Teaching programs that were part of the child's education plan were selected as targets. Teaching materials were laminated pictures of objects, shapes, lower and upper case letters, words, numbers and quantities, The size of the pictures were approximately 11x8 cm. Two identical sets of training material were made, one for the participant and one for the experimenter to use during the training sessions for modeling.

Setting

The experimenter tested the technical equipment at the remote sites prior to each broadcast. During testing at the remote site the experimenter used the "self-view" function in Movi^{TM} to find the best angle for the web-camera. First the angle of the laptop screen was adjusted for the participants to have a good view of the experimenter at the host site (ca 75-80 degrees angle), then the external web-camera was adjusted to get a good view of the training

situation at the host site. To test the stability of the network each test-broadcast lasted a minimum of 15 minutes. The participants were taught how to activate the video camera and how to logon to Movi™. The experimenter called up the host site with the laptop and Movi™ from the remote site, and then traveled to the host site to start the session. When the session started, the participant was instructed to activate the video-camera.

At the host site the screens were placed side by side and centered on the wall, and the camera was placed centered on top of and between the screens. The experimenter was seated at a table facing the screens, with a table alongside for the training materials, scripts, mobile phone and the remote controls for the videoconferencing unit. The ETE-sheet, the forms describing the teaching programs, the timer and pen and paper were placed on the working table.

Different classrooms had to be used at the school based on which rooms the children were familiar with. In the pre-school an office was used, which the child was familiar with. All of the rooms had shelves with toys and teaching materials visible for the children, and at least one window. At both sites the participant and the child were sitting on a chair opposite each other with a table between them. The training material and the specific program for each participant and child were prepared by the experimenter before each session, and the prepared teaching material was placed on a chair or a small table next to the participant.

At the remote site the technical equipment was placed on top of a table 1 1/2 - 2 meters from the teaching table's side. The laptop was placed on a chair on top of the table with the screen directed towards the participant and child. The external web-camera was placed on the top of the laptop's screen. The video-camera was placed on top of the table next to the chair. The video-camera also had a small screen which could be rotated. This screen

was turned away from the participant during the sessions. External speakers were placed under the chair.(see figure 1 for the setups).

---Insert Figure 1 about here---

With the on-site group, the chairs, tables and training material were arranged the same way as with the videoconferencing group, but only the video-camera was placed on top of the table were the laptop had been placed. The experimenter was sitting at this table at approximately the same position as the screen of the laptop with the videoconferencing group, and with the same support materials available (the timer, scripts, etc.). Both groups had a folder with extra teaching material available in the room. This material was prepared in case the programs had to be changed, or in case the child was mastering a specific target and a new target was needed.

Dependent variables

*DTT skill*s. The effect of the supervision was measured by the scores obtained on the Evaluation of Therapeutic Effectiveness scoring sheet (ETE) (Eldevik et al., submitted) adapted from Koegel, Russo, & Rincover, (1977) at pre, post, and follow-up tests (see Appendix D for scoring form). Teaching skills were divided into 5 categories with a total of 22 sub-points; 1) Sd's; a) Discriminable. Stands out. Distinct onset and offset. Does not occur together with name or verbal clutter, b) appropriate; teacher asks for the target. Does not mistakenly ask for wrong item, c) consistent; uses the predetermined SD's, d) uninterrupted; SD's are not interrupted by instructions to sit nicely or other behavior from the teacher, e) attending; the child should be attending to the teacher or the material when SD is issued. 2)

Prompts; a) effective. Must produce a correct response, b) swift; within 5 seconds and, if possible, so that the child is not allowed time to make an incorrect response, c) frequent; the child should not be allowed to make more than two incorrect responses before prompted. 3) Shaping; approximation. Should only reinforce responses at least as good or closer approximations to target. 4) Consequences; a) Immediate. Within 3 seconds. Preferably within 0,5 seconds, b) contingent. Reinforces only correct responses, not incorrect ones, c) unambiguous. Praise should sound positive. Information should sound neutral, d) consistent. All correct responses should be reinforced during acquisition, e) effective. Tangibles (if used) should be approached/readily taken by the child, f) paired with praise. Praise should always come prior to the tangible reinforcer, g) size. The amount/size of reinforcement is related to the child's effort, h) no response. If there is no response from the child in 5 seconds, teaching is continued. 5) Structure; a) learn unit; the trial consists of a discrete trial unit (Sd/R/Sr), b) ending positive. The session is ended with a correct response (this point was excluded in the present study as the experimenter ended all sessions), c) opportunity. After a prompted response, the child is given opportunity to do the task without prompt, d) pace. Inter trial interval should not be more than 5 seconds (including onset from starting session), e) variation. Except under massed trial, no task should be repeated more than twice consecutively in the same way if performed correctly.

In order to accurately score the teacher performance the child's response on each trial was scored as correct, incorrect or prompted in the child-score section of the ETE-form. Each videoclip was thus looked at two times; the first time the child's responding was scored, and the second time the participants teaching skills was scored.

Pilot tests

Three pilot tests were conducted using with videoconferences broadcasted from laptop to laptop via the NHN in the experimenters home. Adjustments were done on the intended length of the intervention, the size of training materials, placement and angles of the video-camera and the screen of the laptop for the participant to have a good view of the experimenter, and vice versa. It was decided not to use the experimenters work-laptop, as its security setting terminated the display after 15 minutes with a login message. This laptop when running Movi™ version 4.1 interpreted the videoconference as data inactivity, not data transmission, and terminated the display. This also happened with another laptop, but this was solved by deactivating the screensaver. It was decided that the broadcasting was to be conducted with the videoconferencing equipment at the host site and a laptop with Movi™, version 4.1 placed at the remote sites. The laptop, external web-camera and speaker were used with all participants, and the login was bootstrapped, to ensure that the logon to NHN was stable. One major obstacle occurred as the firewall in the local municipality network obstructed the connection to the NHN. The municipality commissioned an ICT-consultant who cooperated closely with a consultant at NHN and the product manager for Movi™ at Cisco in troubleshooting and adjusting the different data access arrangements. During the whole period of both the pilot testing and the actual study, the experimenter had direct access to a consultant at NHN and the product manager for Movi™ at Cisco. They contributed with direct support through both videoconferencing and telephone calls.

Procedure

Experimental Design. A pretest-posttest design with random assignment to groups was employed. To measure effects of the training within each group dependent t-tests were conducted to compare the pre- and posttest scores, and effect sizes were computed. To compare the effects of videoconferencing and on-site training independent t-test were

conducted between the groups (Shadish, Cook & Campbell, 2002). Similar analyses were conducted to see if effects maintained at a follow-up test two months later.

Assignment. First, the order of the type of supervision was determined at random by making 16 lots of paper, eight labeled VC (videoconference) and eight labeled on-site. Starting at "1", each lot was drawn at random and successively added into a numbered list of 16. Secondly, the participants were randomly assigned to the groups by drawing lots labeled with the participants names, and then added to the list as described above.

Training. The pretests, intervention and posttests were all conducted the same day for each participant. The follow-up test was done approximately two months later. All participants were offered a short debriefing and feedback after the posttest and the follow-up test. The participants received training on how to conduct DTT with three different teaching programs; matching, receptive and expressive labeling. Each participant had three teaching sessions of 15 minutes. During these sessions the participant got feedback relating to the ongoing teaching program and to the items on the ETE-form. If incorrect teaching was observed the supervisor described and modeled correct teaching. The training phase always started with a short scripted information about DTT. Two trials were modeled before the participant practiced with the child, assisted by instructions, modeling, and feedback from the experimenter.

Testing. The pretest, posttest and follow-up test were identical and consisted of sessions where the participants demonstrated in a real life setting how they would teach a child on the three programs. In all test phases the participant was teaching the child a new task not practiced earlier. Thus; the tasks taught to the child in posttest and follow-up test were not the same as those taught in the prior phases. All participants received the same short scripted information before each test-condition, i.e. in the matching condition; "You are now going to

try to teach the child to match. The matching program is about teaching the child to understand that two objects or pictures are the same". Examples of Sd' s was given; "We usually say "find the same" or "put with same". Then they received the instruction "Try to teach the child to match. Do the best you can. And - go." Each of the three test sessions (one for each program) lasted 2 1/2 minutes. No feedback from the experimenter was given during the tests.

Scoring criteria. The child' s response were scored as either correct, incorrect or prompted on each trial. For the DTT skills each of the 21 items was scored as either correct, incorrect, or not applicable (NA) in intervals of 30 seconds (as in Koegel at al., 1977). Correct was only scored if all instances of an item were performed correctly during that interval. For instance, if there were three trials during an interval, a particular item had to be performed correctly on all three trials in order to obtain a "correct" score. If an item was performed incorrectly in one (or more) of the trials the score for that item would be "incorrect".

Inter-rater-reliability. The inter-rater-reliability (IRR) was estimated by a point-by-point agreement ratio (Kazdin, 1982). IRR was scored in 19 of 94 films (ca 20%) spread over the different phases. Two independent co-scorers at Habiliteringsavdelingen, Vestre Viken HF participated. Both co-scorers had a bachelor degree as social educators. One of them had six years experience using DTT, and the other a masters degree in behavior analysis and about 20 years experience with applied behavior analysis, but no experience with DTT. Their scoring was calibrated with the experimenter until a minimum of 90% agreement was reached. Four different filmclips were used in this phase, each film clip lasting 2 1/2 minutes. The first day the co-scorers were taught how to use the ETE-sheet, and one clip lasting 2 1/2 minute was observed and scored over five intervals of 30 seconds. The second day three clips of same duration were scored, and the IRR for each interval was computed. The experimenter distributed clips involved in the present study between the two co-scorers so that when one

scored a pretest, the other scored the posttest of a particular child. The IRR in the follow-up tests was scored by only one of the scorers, as the other scorer was not available. Prior to the scoring, the experimenter had scored the children's responses and marked the time intervals visually with horizontal lines on the child score section in the ETE sheet. The experimenter scored the videos sitting in the same room as the co-scorer. IRR was calculated by dividing number of agreements with the number of agreements + disagreements multiplied by 100. The mean agreement was calculated to 92.4 % for one of the co-scorers (range 85.7%-99%) and 88,9% for the other (range 80.9%-96.2%).

RESULTS

First, a series of dependent t-tests were done to see if the participants improved their teaching between the pretest to the posttest and from the pretest to the follow up test. The average performance on the three teaching programs and the average performance on each separate teaching program were compared within each group. The average performance within both groups improved significantly ($t(6) = -5.8$, $p < .01$ for the on-site group and $t(6) = -17.53$, $p < .01$ for the videoconference group), and from pretest to follow-up test ($t(4) = -8.99$, $p < .01$ for the on-site group and $t(4) = -5.37$, $p < .01$ for the videoconference group).

However, when analyzing the programs separately there were no significant change in the receptive and expressive conditions in the posttest and in the matching, receptive and expressive conditions in the follow-up for the on-site group, and this was the same with the videoconference group in the receptive condition in follow-up (see table 1 for details). The effect-sizes (ES) were estimated using the formula $r = t^2/(t^2+df)$, (Field, 2009; Wilkinson, 1999). For the videoconference group the ES was .99 from pretest to posttest and .93 from

pretest to follow-up. For the on-site group the ES was .92 from pretest to posttest and .97 from pretest to follow-up (see table 2 for more details).

Second, a series of independent t-tests were carried out to see if there were any differences between the groups in how much they changed between the pretest and the posttest and follow up. As the groups differed from each other in variances in the different phases (see table 2 for details), Levene's test was examined for the assumption of homogeneity of variances between the groups (Field, 2009). None of the variables showed significance in variances between groups. The t-tests showed no significant differences between the groups on their average DTT performance in the posttest ($t(12) = 1.558$, $p > .05$) or at follow up $t(8) = .450$, $p > .05$. Furthermore, there were no differences when each teaching program was compared separately; matching ($t(12) = 1.126$, $p > .05$ in posttest and $t(8) = .220$, $p > .05$ in follow-up), receptive ($t(8) = 2.276$, $p > .05$ in posttest and $t(5) = .005$, $p > .05$ in follow-up), and expressive ($t(6) = 1.252$, $p > .05$ in posttest and $t(5) = 1.745$, $p > .05$).

Figure 2 shows the average scores in each test condition for both of the groups.

---Insert Tables 1 and 2 about here---

---Insert Figure 2 about here---

DISCUSSION

This study suggests that videoconferencing can work just as well as being on-site when training staff how to implement DTT. Both groups showed significant increase in

average implementation. This was true also with each of the separate teaching programs involved.

Even though scores at follow-up were down from the post test, scores were significantly higher than at the pre test. Furthermore, in the follow-up test all participants demonstrated the ability to teach new programs not involved in the training. Because one child moved to a different city before the follow-up testing was done, seven of the participants worked with a new child and all of them showed generalization of their teaching skills to this new circumstance.

The results in the present study are also interesting as the participants didn't receive any form of didactic training beforehand or a lengthy intervention, just the intervention package of alternating instructions, modeling, and feedback, lasting for 3x15 minutes. The sample sizes are nevertheless small, so the study has to be replicated for generalization of the results to a larger population. Even though the homogeneity of the variance was not violated between the groups, the large variance within each group might be one reason for the non-significant increase in some of the separate programs. However, the effect sizes calculated for each program and on the average of all three programs in both post- and follow-up tests for both groups where large, indicating that the intervention could indeed be a plausible explanation for the enhanced quality in the DTT skills (Field, 2009).

These results are in concert with earlier research on the use of videoconference within applied behavior analysis where it is reported that videoconferences have been used successfully in conducting functional analysis (Barretto et al, 2006; Machalicek et al., 2009a), preference assessments (Machalicek et al., 2009b), and implementation of the ESDM-model (Vismara et al., 2009). Although different procedures have been evaluated in these studies

they all involved novice trainers placed at remote sites receiving direct training and supervision in real life settings with children with ASD.

Some limitations by the present study should be noted. The participants consisted only of novice teachers, and the study evaluated only a limited set of skills within DTT. The components in the ETE-form, as with the DTT components in Koegel et al., (1977), and the Discrete Trial Teaching Evaluation Form (Fazzio et al., 2009), may not be sufficiently fine-meshed to detect more advanced procedures used within the DTT. Inspection of additional scoring sheets might be necessary for detecting skills such as prompt-fading, discrimination training and differential reinforcement. Still, when used with novice teachers during the establishing of teaching skills, the ETE- components do detect advancing skills within the basic DTT framework. To what degree the further advancing DTT training skills of those with high %-correct scores would be detected, is uncertain. A control group could have checked for the bare effects of just being tested and measured and to what degree this would have caused a change in the training skills. This was not done in this study, mainly because the major point for investigation was the effect of videoconferencing as a means while delivering the same intervention to both groups. Sometimes a child was more tired than other times, possibly making it a bit harder for the participants to train with them, but this variable was roughly similar across the groups. As for the follow-up phase approximately two months later, both groups lost two participants for reasons such as a moving of school facilities and tight time schedules for the participants, but the variance within the groups were still similar. The participants knowledge of them being filmed, or just the bare fact of participating in the study might have caused reactivity (Cooper, Heron & Heward, 2007), but this again would apply to both groups with similar effects. Still, in the videoconference group the intervention was disrupted several times due to instable network, resulting in a slightly different internal history in the intervention distributed to this group. Although this might have affected the

results, it is not considered to be a plausible explanation for the enhanced teaching skills with the participants in this group. Instead of randomization, active matching of groups could have been used after all the pretests had been conducted due to the small samples (Kazdin, 2003).

The Movi^{TM}-client resembles more commonly known Internet solutions such as Skype. In this study Movi^{TM} was used while broadcasting over encrypted lines on the NHN. Some issues related to the videoconferences while using Movi^{TM} on the NHN should be mentioned. Although good enough, sometimes the screen picture was a bit blurred. The changing light from the windows during the day also affected the how well the training material on the table was displayed on the screen or the video film, so the training table had to be moved in a different position sometimes. However, simple steps could easily solve issues like this, i.e. by installing curtains or a roller blind. Further, some obstacles did occur during the videoconferences. In four of the seven videoconferences the network was instable at times, once while on cabled network and three times while on the wireless network. This resulted in a termination of the broadcast and caused a temporary breakup in the training for these four participants. The timer was stopped and the trainer at the remote site was called up from the host site, first establishing contact on the mobile phone left available in the training room, then next on Movi^{TM}. Once the connection was reestablished, typically within approximately 5 minutes, the session was continued. Despite these disturbances the results showed substantial effects within the group. Neither did these disturbances show any apparent affect on any of the children. The means of %-correct skills were in favor of the on-site group in all conditions, also before the initiated intervention. As visualized in figure 1, the average teaching skills within each group showed a similar parallel progress from pretest to posttest, and from posttest to follow-up. Still, the videoconferencing group showed a slightly higher increase of average %-correct skills in the post and follow- up condition. Although this

difference was none-significant, novelty effects due to the means of videoconferencing could be one explanation for this (Kazdin, 2003).

The participants in this study were randomly assigned to the groups to minimize the likelihood of selection biases. Both groups received the same intervention, and the experimenter conducted all tests and interventions with all participants. The posttests were carried out directly after the interventions was ended and cover for validity threats such as maturation and external history. This study also had a high IRR and ES. Altogether, as such, this study has demonstrated a decent reliability (Cooper et al., 2007; Kazdin, 2003; Shadish, Cook & Campbell, 2002).

In the context of remote training and supervision within the specialist healthcare services, the use of Movi^{TM} would also imply using the network at the remote sites. To achieve an approximately equal access to such remote services in the different municipalities, this leads to one major obstacle that has to be dealt with; the local firewalls. In the pilot phase of this study a comprehensive troubleshooting were carried out with the ICT-unit in the municipality due to clearing the way through the firewall for Movi^{TM}. Such an attitude may not apply to all municipalities. One solution well worth investigating would therefore be the use of a mobile broadband on the laptop connected to the NHN. In this way one could get past the firewalls in the local network, while still giving remote supervision and training over an encrypted line. Further suggestions for future research would be a systematic replication of this study while adding a control group with no intervention to check for possible effects of the testing and measuring, and further, to differentiate the intervention given to the on-site group by interacting with the participant at the training table, i.e. changing place with the participant to demonstrate a trial with the child. Other important topics would be to investigate more advanced teaching techniques such as prompt fading procedures,

discrimination training, differential reinforcement, and the establishing of token systems to see if this could be implemented using videoconference.

This study has demonstrated that novice teachers can rapidly be taught how to conduct basic DTT through videoconferencing. Although the results in this study are preliminary, they are in general promising. The research that has been conducted on videoconferencing within the field of applied behavior analysis is exceptional limited today, and further research will be needed to detect and demonstrate both promising and less suited areas for such remote training and supervision.

For the specialist healthcare services and other similar service providers, EIBI implies a long lasting and frequent follow-up of children with ASD as well as their parents and local care providers. Schools and pre-schools are quite often also faced with hard-pressed budgets. As such, a purchase of expensive videoconferencing equipment is not particularly likely to happen. The results of the present study with the use of an inexpensive, widely accessible laptop at the remote sites while enabling a secure exchange of sensitive information on the NHN is therefore especially promising regarding EIBI services, as most schools and pre-schools have such equipment available today.

The topics forwarded here are not intended as arguments for a total replacement of traditional training and supervision with remote solutions. Rather, they are pointing at new promising paths to supplement the traditional ways of supervision and training of DTT trainer skills in particular, and within the field of applied behavior analysis in general.

REFERENCES

Allen, K., D., & Warzak, W., J. (2000). The problem of parental nonadherence in clinical behavior analysis: effective treatment is not enough. *Journal of applied behavior analsysis, 33*, 373-391.

Arco, L. (1997). Improving program outcome with process-based performance feedback. *Journal of organiztional behavior management, 17*, 37-64.

Arnal, L., Fazzio, D., Martin, G., Yu, C., T., Keilback, L., & Starke, M. (2007). Instructing university students to conduct discrete trials teaching with confederates simulating children with autism. *Developmental disabilities bullentin, 35*, 131-147.

Augestad, K. M., & Lindsetmo, R. O. (2009). Overcoming distance: video-conferencing as a clinical and educational tool among surgeons. *World journal of surgery, 33*, 1356-1365.

Bach, B., Sørli, H., & Driveklepp, A., M. (2010). *Telemedisin i rehabilitering - Bruk av IKT i pasientoppfølging (English summary)* (Rapport No. 06-2010). Tromsø: Nasjonalt senter for samhandling og telemedisin.

Barretto, A., Wacker, D. P., Harding, J., Lee, J., & Berg, W. K. (2006). Using telemedicine to conduct behavioral assessments. *Journal of Applied Behavior Analysis, 39*, 333-340.

Eikeseth, S. (2010). Examination of qualifications required of an EIBI professional. *European journal of behavior analysis, 11*, 239-246.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2002). Intensive behavioral treatment at school for 4- to 7-year-old children with autism: a 1-year comparison controlled study. *Behavior modification, 26*, 49-68.

Eikeseth, S., Smith, T., Jahr, E., & Eldevik, S. (2007). Outcome for Children with Autism who Began Intensive Behavioral Treatment Between Ages 4 and 7: A Comparison Controlled Study. *Behavior modification, 31*, 264-278.

Eldevik, S., Hastings, R., P., Jahr, E., Hughes, J., C. (2011). Outcomes of behavioral intervention for children with autism in mainstream pre-school settings. *Journal of autism and developmental disorders,* (07 April 2011). doi:10.1007/s10803-011-1234-9

Eldevik, S., Ondire, I., Hughes, J., C., Grindle, C., Randell, T., & Remington, B. (submitted). Effects of computer simulation training on real life dicrete trial teaching.

Elford, R., White, H., Bowering, R., Ghandi, A., Maddiggan, B., & John, K., St. (2000). A randomized, controlled trial of child psychiatric assessments conducted using videoconferencing. *Journal of telemedicine and telecare, 6,* 73-82.

Fazzio, D., Martin, G.L., Arnal, L., & Yu, D. C. T. (2009). Instructing university students to conduct discrete trials teaching with children with autism. *Research in autism spectrum disorders, 3,* 57-66.

Field, A. (2009). *Discovering statistics using SPSS (and sex and drugs and rock `n`roll)* (3 ed.). London: SAGE Publications Ltd.

Gammon, D., Sorlie, T., Bergvik, S., & Hoifodt, T. S. (1998). Psychotherapy supervision conducted via videoconferencing: a qualitative study of user experiences. *Nordic journal of psychiatry, 52*, 411-421.

Green, G. (1996). Early behavioral intervention for autism: what does research tell us? In C. Maurice, Green, G., & Luce, S. (Ed.), *Behavioral intervention for young children with autism: a manual for parents and professionals*. Austin, Texas: PRO-ED inc.

Iwata, B., A., Dorsey, M., F., Slifer, K., J., Bauman, K., E., & Richman, G., S. (1994). Toward a functional analysis of selfinjury. *Journal of Applied Behavior Analysis, 27*(2), 197-209.

Iwata, B. A., Dorsey, M., F., Slifer, K., J., Bauman, K., E., Richman, G., S. (1982). Toward a functional analysis of self-injury. *Analysis and Intervention in Developmental Disabilities, 2,* 3-20.

Kazdin, A. E. (1982). *Single-case research designs. Methods for clinical and applied settings*. New York: Oxford university press, Inc.

Kazdin, A. E. (Ed.). (2003). *Research design in clinical psychology* (4 ed.). Boston, MA: Allyn & Bacon.

Koegel, R. L., Glahn, T., J., & Nieminen, G., S. (1978). Generalization of parent-training results. *Journal of applied behavior analsysis, 11*, 95-109.

Koegel, R. L., Russo, D. C., & Rincover, A. (1977). Assessing and training teachers in the generalized use of behavior modification with autistic children. *Journal of Applied Behavior Analysis, 10*, 197-205.

Leaf, R., & McEachin, J. (1999). *A work in progress: behavior management strategies and a curriculum for intensive behavioral treatment of autism*. New York: DRL Books.

Lovaas, O., & Smith, T. (2003). Early and intensive behavioral intervention in autism. In A. Kazdin, E. & Weisz (Ed.), *Evidence-based psychotherapies for children and adolecents* (pp. 325-340). New york: NY: Guilford Press.

Lovaas, O., I. (1982). *Teaching individuals with developmental delays: basic intervention techniques* Austin, Texas: Pro ed

Machalicek, W., O'Reilly, M., Chan, J., M., Lang, R., Rispoli, M., Davis, T., Shogren, K., Sigafoos, J., Lancioni, G., Antonucci, M., Langthorne, P., Andrews, A., & Didden, R. (2009). Using videoconferencing to conduct functional analysis of challenging behavior and develop classroom behavioral supprt plans for students with autism. *Education and training in developmental disabilities, 44*, 207-217.

Machalicek, W., O'Reilly, M., Chan, J., M., Rispoli, M., Lang, R., Davis, T., Shogren, K., Sorrels, A., Lancioni, G., Sigafoos, J., Green, V., & Langthorne, P. (2009). Using videoconferencing to suppert teachers to conduct preference assessments with students

with autism and developmental disabilities. *Research in autism spectrum disorders, 3*, 32-41.

Maurice, C., Green, G., & Luce, S. (1996). *Behavioral intervention for young children with autism: a manual for parents and professionals*. Austin, Texas: PRO-ED inc.

Morrison, J., Bergauer, N., K., Jacques, D., Coleman, S., K., & Stanziano, G., J. (2001). Telemedicine: cost-effective management of high-risk pregnancy. Retrieved from http://www.managedcaremag.com/archives/0111/0111.peer_highrisk.html October 14. 2011

Northup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., & Cook, J., et al. (1991). A brief functional analysis of aggressive and alternative behavior in an outclinic setting. *Journal of applied behavior analysis, 24*, 509-522.

Sarakoff, R., A., & Sturmey, P. (2004). The effects of behavioral skills training on staff implementation of discrete-trials teaching. *Journal of applied behavior analsysis, 37*, 535-538.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Expermimental and quasiexperimental designs for generalized causal inference*. Boston, New York: Houghton Mifflin Company.

Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on autism and other developmental disabilities, 16*(2), 86-92.

Smith, T., Donahoe, P., A., & Davis, B., J. (2001). The UCLA Young Autism Project. In J. Handleman, S., & Harris, S., L. (Ed.), *Preschool Education Programs for Children with Autism* (2 ed., pp. 29-48). Austin, Texas: Pro-ed.

Sorlie, T., Gammon, D., Bergvik, S., & Sexton, H. (1999). Psychotherapy supervision face-to-face and by videoconferencing: a comparative study. *British journal of psychoterapy, 15*(4), 452-462.

Sturmey, P., & Fitzer, A. (2007). *Autism specter disorders: applied behavior analysis, evidence and practice*. Austin, Texas: Pro-Ed.

Symes, M., D., Remington, B., Browns, T., & Hastings, R., P. (2006). Early intensive behavioral intervention for children with autism: therapists perspectives on achieving procedural fidelity. *Research in developmental disabilities, 27*(30-42).

Thomson, K., Martin, G., L., Anral, L., Fazzio, D., & Yu, C., T. (2009). Instructing individuals to deliver discrete trials-teaching to children with autism spectrum disorders: a review. *Research in autism spectrum disorders, 3*, 590-606.

Tousignant, M., Boissy, P.,Corriveau, H., & Moffet, H. (2006). In home telerehabilitation for older adults after discharge from an acute hospital or rehabilitation unit: a proof-of-concept study and cost estimation. *Disability and rehabilitation: assessive technology, 1*, 209-216.

Verhoeven, F., Gemert-Pijnen, L., Dijkstra, K., Nijland, N., Seydel, E.,, & Steehouder, M. (2007). The contribution od teleconsultation and videoconferencing to diabetes care: a systematic litterature review. doi:10.2196/jmmir.9.5.e37

Vismara, L. A., Young, G.S., Stahmer, A.C., Griffith, E.M., & Rogers, S. J. (2009). Dissemintaion of evidence-based practice: can we train therapists from a distance? *Journal of autism and developmental disorders, 39*, 1636-1651.

Wilkinson, L., & American Psychological Association Task Force on statistical inference. (1999). Statistical methods in psychology journals: guidelines and explanations. *American Psychologist, 54*, 594-604.

Zarate, C., Weinstock, L., Baer, L. (1997). Applicability of telemedicine for assessing patients with schizophrenia: acceptance and reliability. *The journal of clinical psychiatry, 58*, 22-25.

Tabell 1

Oversikt over opplæringsmetoder og målevariabler, inkludert generalisering og opprettholdelse av trenerferdigheter, samt målt læringseffekt hos barnet

OPPLÆRING	Koegel et al. 1977	Arco 1997	McBride & Schwartz 2003	Sarakoff & Sturmey 2004	Ryan & Hemmes 2005	LeBlanc et al. 2005	Randell et al. 2006	Lafasakis & Sturmey 2007	Dib & Sturmey 2007	Crockett et al. 2007	Arnal et al. 2007	Belfiore et al. 2008	Bolton & Mayer 2008	Downs et al. 2008	Catania et al. 2009	Fazzio et al. 2009	Thiessen et al. 2009	Eldevik et al. submitted
DTT Opplærings-komponenter	13	4	5	10	12	10	Dtkid	10	14	8	19*	5	7	30	10	19*	21 (DTTEF)*	Dtkid
Selv-instruksjon	x	x	x	-	x	-	-	-	-	-	x	-	-	-	-	x	x	-
Studiespørsmål	-	-	-	-	x	-	-	-	-	-	x	-	-	-	-	-	-	-
Kurs/workshops	-	-	x	-	x	-	-	-	-	x	-	-	x	x	-	-	-	-
Video observasjon	x	x	-	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-
Vokal instruksjon	-	-	-	x	x	x	-	x	x	-	-	-	x	-	x	-	-	-
Modellering	-	-	-	x	x	-	-	x	x	-	-	-	x	x	-	-	-	-
Selv-obs av video	-	-	-	-	-	-	-	-	-	-	-	x	-	-	x	-	-	-
Rollespill	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	x	-	-
Elektronisk	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	x
Skriftlig feedback	-	x	-	-	x	-	-	-	-	-	x	-	-	x	-	-	-	-
Graf o.l. feedback	x	-	-	x	-	-	-	x	-	-	-	-	-	-	-	-	-	-
Vokal feedb. utførelse	x	x	x	x	x	x	-	x	x	-	x	-	x	x	-	x	-	-
MÅLEVARIABLER																		
DTT-komponenter	13	4	5	10	12	10	24	10	14	8	19*	5	7	30	10	19*	21	22 (ETE)
Spørreskjema	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delt. skåring av video	-	-	-	-	-	-	x	-	-	-	-	x	-	-	-	-	-	x
Elektronisk	-	-	-	-	-	-	90%korr	-	-	-	-	-	-	-	-	-	-	90%korr
Likert skala	-	-	-	-	-	-	x	-	-	-	-	-	-	-	-	-	-	x
IRR	94.6%	??	97%	89/93/ 94%	98 %	97 %	-	94/95/ 93%	-	91%	94/95%	96 %	92.5%	97 %	93 %	97 %	91%	85 %
Opplæring/ varighet	25t	tid uspes	80%korr	90%korr	25-35t	-	40-50 min	90%korr	-	12-18t	2t/3.7tt	-	3t	8t	3 stab pkt	2.6t	4.5t	2 x 10 min
Effekt av DTT på barnets læring	x	x	x	-	-	-	-	x	-	-	-	-	-	x	-	-	-	-
Generalisering	x	-	x	-	x	-	-	x	-	x		-	-	x	x	x	x	x (ETE)
Opprettholdelse	-	-	-	-	-	x	-	-	-	-	-	-	-	x	x	-	-	-

Note 1: 3 studier er ikke med i tabellen; Babel et al., 2009; Koegel et al, 1978; Sabel et al., 2008. Koegel et al (1978). replikerte studien til Koegel et al.,1977, og Babel et al, og Sabel et al. brukte de samme DTT komponentene som hos Thiessen et al.

Note 2: * = samme DTT komponenter. Hos Thiessen et al. er to komponenter lagt til.

Table 1 - Article 2

Individual and average scores on the real life teaching programs as measured with the ETE scoring form are shown for the pre tests, post tests, and follow-up tests, along with the mean, standard deviation and range.

	Pre (n=7)				Post (n=7)				Follow up (n=5)			
On-site	Matching	Receptive	Expressive	Mean	Matching	Receptive	Expressive	Mean	Matching	Receptive	Expressive	Mean
1	49.1	71.6	49.8	56.9	93	96.7	97.1	95.6	60	90.9	89.5	80.1
2	39.3	-	-	39.3	74.5	-	-	74.5	-	-	-	-
3	6	5.5	-	5.7	79.5	84.8	-	82.2	42.4	29.1	-	35.8
4	34.7	36.8	-	35.8	81.7	97.3	-	89.5	-	-	-	-
5	71.3	excl	77.6	74.5	88.3	excl	90.2	89.3	83.7	excl	94.8	89.3
6	39.5	-	-	39.5	89.4	-	-	89.4	68.7	-	-	68.7
7	72.9	excl	39.7	56.3	89.2	excl	85.8	87.5	70	excl	94	82
Mean	44.7	37.9	55.7	44	85.1**	92.9	91	86.8**	64.9	60	92.7	71.2**
SD	23	33	19.6	21.6	6.3	7	5.6	6.7	15.1	43.6	2.8	21.1
Range	(6-72.9)	(5.5-71.6)	(39.7-77.6)	(5.8-74.4)	(74.5-93)	(84.8-97.3)	(85.8-97.1)	(74.5-95.6)	(42.4-83.7)	(29.1-90.9)	(89.5-94.8)	(35.8-89.3)

*$p < .05$. **$p < .01$.

	Pre (n=7)				Post (n=7)				Follow up (n=5)			
Video	Matching	Receptive	Expressive	Mean	Matching	Receptive	Expressive	Mean	Matching	Receptive	Expressive	Mean
1	21.6	22.6	9.3	17.8	73.9	62.7	65.5	67.4	25.8	35.8	67.9	43.2
2	23	45	33.5	33.8	84.3	82	81.3	82.5	69.7	54.5	79.8	68
3	51.9	45.9	-	48.9	85.9	80.5	-	83.2	-	-	-	-
4	55.8	18.6	10.1	28.2	83.7	78.6	92.4	84.9	89.7	87.8	97	91.5
5	19.7	40.5	-	30.1	84.1	85.2	-	84.7	58.4	51.9	-	55.2
6	17.5	29.3	28.8	25.2	71.9	68	72.4	70.8	67.5	69.5	73.3	70.1
7	30	41.9	45.3	39.1	85.5	91.5	94.5	90.5	-	-	-	-
Mean	31.3	34.8	25.4	31.9	81.3**	78.3**	81.2**	80.5**	62.2*	59.9	79.5**	65.6**
SD	15.8	11.1	15.5	10	5.8	9.9	12.5	8.3	23.3	19.6	12.6	18.1
Range	(17.5-55.8)	(18.6-45.9)	(9.3-45.3)	(17.8-48.9)	(71.9-85.9)	(62.7-91.5)	(65.5-94.5)	(67.4-90.5)	(25.8-89.7)	(35.8-87.8)	(67.9-97)	(43.2-91.5)

*$p < .05$. **$p < .01$.

Table 2 - Article 2

Effect sizes within both groups from pretest to posttest, and pretest to follow-up.

		r	
	Compared relationsships	Onsite	Video
1	Pre Matching-Post Matching	.90	.96
2	Pre Receptive-Post Receptive	.92	.98
3	Pre Expressive-Post Expressive	.91	.97
4	Pre Matching-FollowUp Matching	.77	.90
5	Pre Receptive-FollowUp Receptive	.99	.77
6	PreExpressive-FollowUp Expressive	.92	.92
7	Pre Mean-Post Mean	.92	.99
8	Pre Mean-FollowUp Mean	.97	.93

Figure captions

Figure 1. The upper part in Figure 1 shows the set-up at the host site with the screens, microphone, tables and teaching materials. The experimenter was sitting on the chair facing the screens during the videoconference. The lower part in Figure 1 shows the set-up at the remote sites with the laptop, video camera, speakers, tables and teaching materials. When training was delivered on-site, the experimenter was placed on a chair facing the work desk approximately in the same place as the placement of the lap-top.

Figure 2. Average scores for the DTT teaching skills in both groups from pretest to posttest, and from posttest to follow-up.

Figure 1

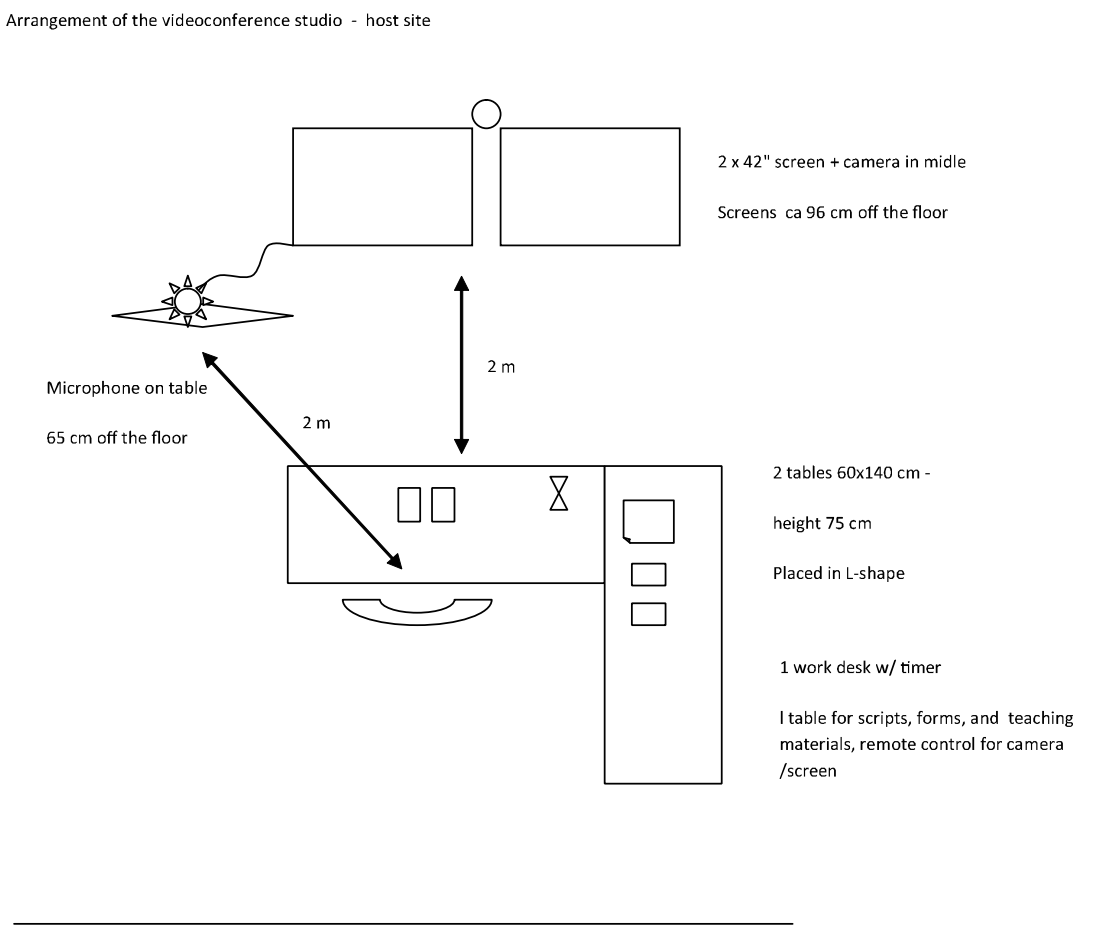
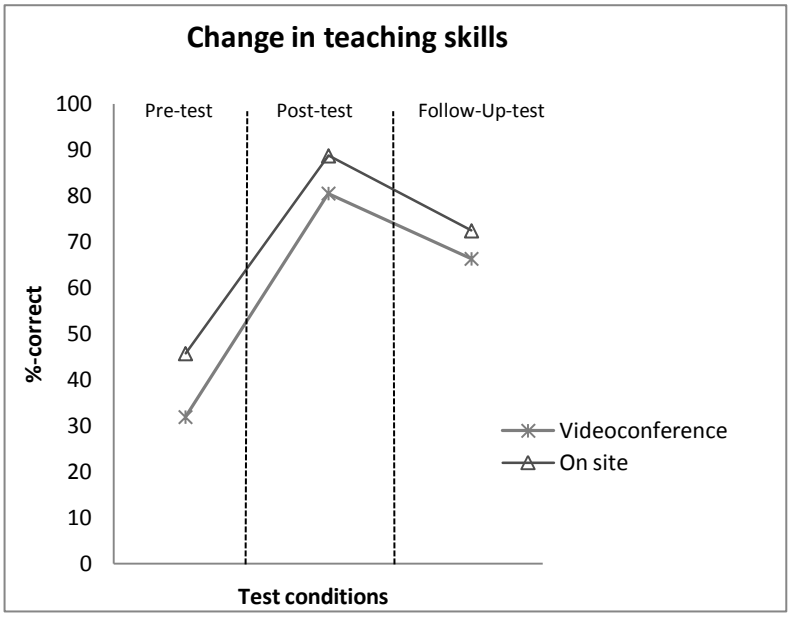

Arrangement of the videoconference studio - host site
2 x 42" screen + camera in midle
Screens ca 96 cm off the floor
2 m
Microphone on table
65 cm off the floor
2 m
2 tables 60x140 cm -
height 75 cm
Placed in L-shape
1 work desk w/ timer
I table for scripts, forms, and teaching materials, remote control for camera /screen
Arrangements - remote site
1 1/2 - 2 m
Video camera on tripod
Laptop (on chair) with external web-cam
Laptop screen 75-80 dgr angle
Speaker under laptop/(chair)
All items placed on table - laptop on chair on the table
2 chairs + 1 work desk
1 small table for teaching materials

Figure 2


Change in teaching skills
100
90
80
70
60
50
40
30
20
10
0
%-correct
Pre-test
Post-test
Follow-Up-test
Videoconference
On site
Test conditions

Appendix A

Script for the pretest, posttest and follow-up test, each with a 2 1/2 minute duration.

Before we start the training, I wish to see how *you* would teach the child the skills we are going to work on with the child. We are going to work with three different programs. I will start a timer that signals after 2 1/2 minutes per program, where you are trying to teach the child the skill on your own. This will take less than 10 minutes. In this period you will not receive any feedback from me, only the start instructions. After having showed me how you would conduct this teaching, you will receive training in the methods afterwards (this last sentence was only said in pretest).

So, let's start.

Matching. What you are going to do now, is to try to teach the child how to match. Matching is about teaching the child to understand that two things are alike. What we often say then is "Find same", or "Put with same". So now I tell you; ”Try to teach the child how to match. Do the best you can. And - go."

Thank you for your efforts. Now we change to the next program, also with a duration of 2 1/2 minute. You will still only receive a start instruction from me.

Receptive labeling. What you are going to do now, is to try to teach the child receptive labeling. Receptive labeling is about teaching the child to identify a picture or an object that you label. What we often say then is "Show me ..." or "Point to ...". So now I tell you; ”Try to teach the child receptive labeling. Do the best you can. And - go."

Thank you for your efforts. Now we change to the next program, also with a duration of 2 1/2 minute. You will still only receive a start instruction from me.

Expressive labeling. What you are going to do now, is to try to teach the child expressive labeling. Expressive labeling is in this program about how to teach the child how to vocally label a picture of an object or symbol. What we often say then is; "What is this"? So now I tell you; ”Try to teach the child expressive labeling. Do the best you can. And - go."

Thank you for your efforts. Now we will start the training.

Appendix B

Script for DTT.

First, I will set the timer for countdown of the time - before we start. We will work in 15 minutes in each of three programs.

You will now receive training in how to conduct Discrete Trials Teaching, a teaching approach based on applied behavior analysis.

DTT consists of a series of discrete repetitions with a distinct beginning and an end. The child receives short, distinct instructions, and an immediate reward/reinforcement when correct response is produced. The child shall receive help to produce the correct response up to attained mastery.

We will gradually strive to get a certain pace - intensity here refers to a series of rapid and successive repetitions - in order to try to achieve a flow in the child's responses. A short period of time between the instruction and the child's response, establishes a connection between the two of them. A short period of time between the child's response and your consequence/reinforcement, establishes a connection between the two, and is a way to more precisely demonstrate what your want the child to do.

So, now we will start the training.

Appendix C - Example of a planned program in pretest, training and posttest, with cues

”……..” and Trainer …… Date: …..day …….

Age: 10 years
Diagnosis: F84.0 and moderate dev.dis.

Pretest: square, triangle, circle, star
Posttest: P, A, L, S, I, M

Reinforcers:
- praise
- clapping
- Pringles
- tickeling
- tap on table

MATCHING	- Important for helping the child to understand that 2 items are alike.	- Learns to differentiate between objects, behavior and language elements in the environment.	Fundamental element for later complex behavior.
Further tasks: Colours/shapes: Yellow circle, red square, white triangle, black star		The child knows: Objects: 3D-3D, 2D-2D, 3D-2D Colours: Yes Shapes: No Letters: No Numbers: No	

			Notes	Sd - instruction
Square	1.	aRa	Presents stimulus		”Find same”
Triangle	2.	bRb / aDRa (D = distractor)	New stimulus Fade prompts systematically →most-to-least		
	Discrimination teaching		Important! A fundamental training process that teaches the child to differentiate between stimuli. Constitutes the most important procedure for helping the child to *direct its attention* to the crucial element in an instruction.		
	3.	abRa	-Positions prompts Fade prompts systematically →most-to-least -Change stimuli positions		Differentiates "a" from "b" by the element "same" in the instruction.
	4.	abRb			Differentiates "b" from "a" by the element "same" in the instruction.
Circle	5.	cRc	Ny stimulus		Builds repertoire
	6.	abcRc	-Position prompts Fade prompts systematically →most-to-least -Change stimuli positions		Differentiates "c" from "a" and "b" by the element "same" in the instruction.
	7.	abcRb			”b” – as over
Star	8.	abcRa			”a” – as over

Appendix D - The Evaluation of Therapeutic Evaluation scoring form, Eldevik et al., submitted

Therapist:				
Child:				
Date:				
#	Score			code/position/comment/target
1	C	I	P	
2	C	I	P	
3	C	I	P	
4	C	I	P	
5	C	I	P	
6	C	I	P	
7	C	I	P	
8	C	I	P	
9	C	I	P	
10	C	I	P	
11	C	I	P	
12	C	I	P	
13	C	I	P	
14	C	I	P	
15	C	I	P	
16	C	I	P	
17	C	I	P	
18	C	I	P	
19	C	I	P	
20	C	I	P	
21	C	I	P	
22	C	I	P	
23	C	I	P	
24	C	I	P	
25	C	I	P	
26	C	I	P	
27	C	I	P	
28	C	I	P	
29	C	I	P	
30	C	I	P	
31	C	I	P	
32	C	I	P	
33	C	I	P	
34	C	I	P	
35	C	I	P	
36	C	I	P	
37	C	I	P	
38	C	I	P	
39	C	I	P	
40	C	I	P	
41	C	I	P	
42	C	I	P	
43	C	I	P	
44	C	I	P	
45	C	I	P	
46	C	I	P	
47	C	I	P	
48	C	I	P	
49	C	I	P	
50	C	I	P	
Coding - Behaviour				
1				
2				
3				
4				
5				

Session type?	Pre	Post1	Post2	IT	Obs

Type of trial?	MT	DT	ET	RR	Other

What is the SD?

What is the target response?

	30-sec recording interval					
1. SD's						
a. ***Discriminable***. Stands out. Distinct onset and offset. Does not occur together with name or verbal clutter.						
b. ***Appropriate***. Teacher asks for the target. Does not mistakenly ask for wrong item.						
c. ***Consistent***. Uses the predetermined SD's consistently.						
d. ***Uninterrupted***. SD's are not interrupted by instructions to sit nicely or other behaviour from the teacher.						
e. ***Attending***. The child should be attending to the teacher or the material when SD is issued						%
2. Prompts	30-sec recording interval					
a. ***Effective***. Must produce a correct response.						
b. ***Swift***. Within 5 seconds and, if possible so that the child is not allowed time to make an incorrect response.						
c. ***Frequent***. The child should not be allowed to make more than two incorrect responses before prompted.						%
3 Shaping	30-sec recording interval					
a. ***Approximation***. Should only reinforce responses at least as good or closer approximations to target.						%
4. Consequences	30-sec recording interval					
a. ***Immediate***. Within 3 seconds. Preferably within 0.5 seconds.						
b. ***Contingent***. Reinforces only correct responses, not incorrect ones.						
c. ***Unambiguous***. Praise should sound positive. Information should sound neutral.						
d. ***Consistent***. All correct responses should be reinforced during acquisition.						
e. ***Effective*** tangibles (if used). Should be approached/readily taken by the child.						
f. ***Paired*** with praise. Praise should always come prior to the tangible reinforcer.						
g. ***Size***. The amount/size of reinforcement is related to the child's effort.						
h. ***No response***. If there is no response from the child in 5 seconds, teaching is continued.						%
5. Structure	30-sec recording interval					
a. ***Learn unit*** . The trial constitutes a discrete learn unit (SD-R-SR)						
b. ***Ending positive***. The session is ended with a correct response						
c. ***Opportunity***. After a prompted response, the child is given opportunity to do the task without prompt.						
d. ***Pace***. Inter trial interval should not be more than 5 seconds (including onset from starting session)						
e. ***Variation***. Except when when MT, no task should be repeated more than twice consecutively in the same way if performed correctly.						%
					Overall average score	%