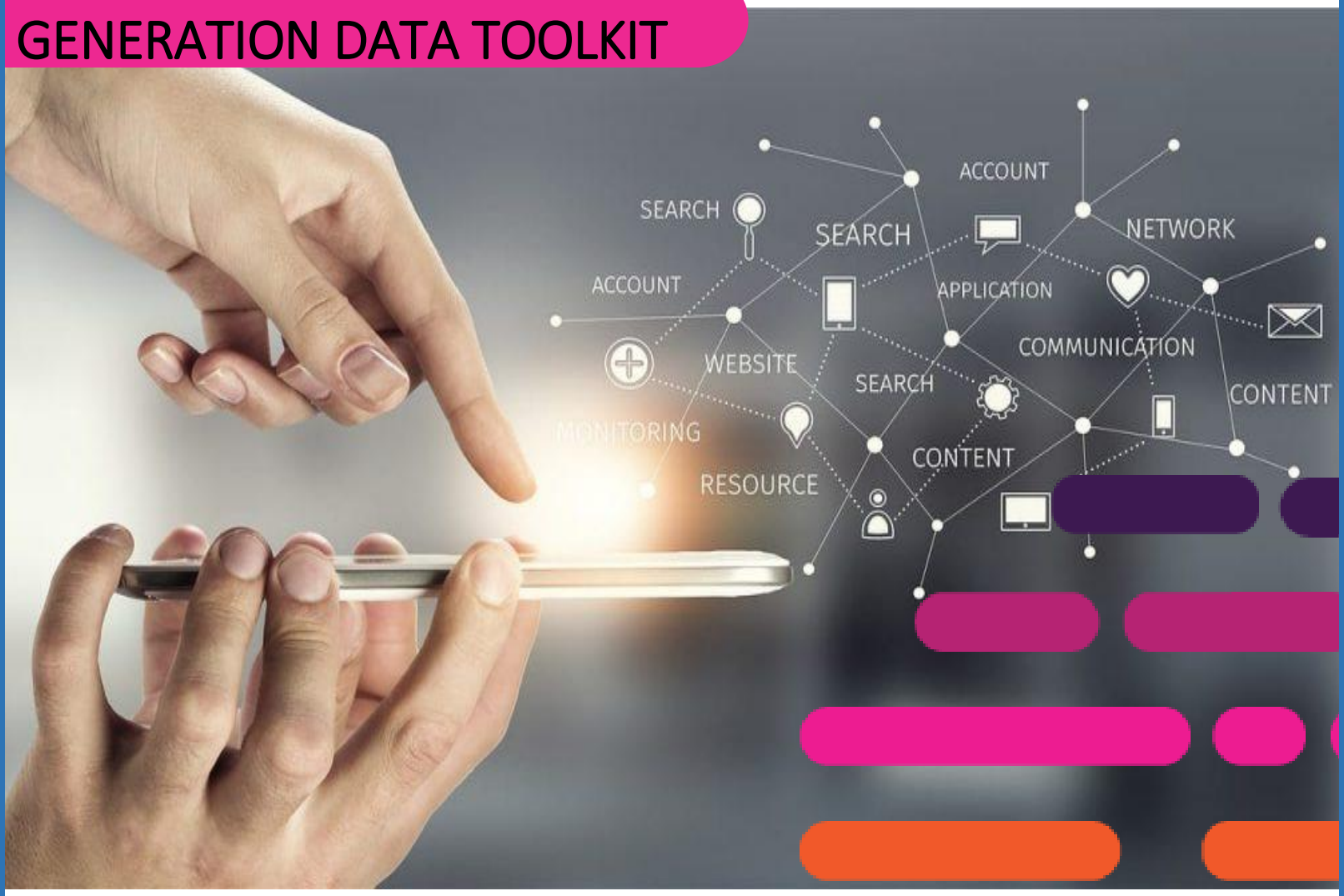
GENERATION DATA

USING DATA FOR PROFIT

GENERATION DATA TOOLKIT



GENERATION DATA TOOLKIT

Szczecin, 2019

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FORKORTELSER

Institution Forkortelse	Navn på institution	Logo Institution	Land
OS	University of Szczecin		Polen
LYIT	Letterkenny Institute of Technology		Irland
VGTU	Vilnius Gediminas Tekniske Universitet		Litauen
EUCEN	European University Continuing Education Network		Belgien, Kroatien, Finland, Grækenland, Tyskland, Ungarn, Litauen, Portugal, Rumænien, Spanien, Schweiz, Storbritannien, Norge, Italien, Polen
EUEI	Europæisk E-learning Institute		Danmark
FELTECH	Feltech Software Innovations Ltd		Irland

Bord 1: Partner Institutioner

I FORSKNING OUTLINE

Processen med forskning er sammensat af visse faser, der viser karakteristika metodiske korrekthed. Rækkefølgen af de strategier præsenteres nedenfor iBord 2Forskning koncept og implementering af forskning:

A. Forskning koncept
1. Formulere en problemstilling
2. Definition variabler og indikatorer
3. Udvælgelse af metoder og værktøjer
4. Vedtagelse af forskningsresultater procedurer

B. Implementering af forskning
1. Gennemførelse af forskning
2. Organisering af data og analyse
3. Udvikling af resultater

Bord 2Forskning koncept og implementering af forskning

I lyset af en hurtigt voksende økonomi, er vi nødt til at udvikle vores digitale færdigheder til at forblive konkurrencedygtige og være en del af det moderne samfund. I alle livets områder, bemærk vi den voksende rolle digitalisering. Derfor er de kompetencer relateret til datahåndtering og oprettelsen af passende it-værktøjer bliver meget ønskelig.

FORSKNING PROBLEMER

I forbindelse med udviklingen af digitalisering, vi støder på de følgende problemer videregående uddannelse:

- for lav betydning for digitaliseringen i personlig udvikling blandt studerende og videnskabelige medarbejdere,
- utilstrækkelige data færdigheder ved det videnskabelige personale og studerende, der er potentielle repræsentanter for fremtidens iværksætter samfund,
- lidt viden om digitaliseringsprojekter processer blandt studerende udmønter sig i at sænke konkurrenceevnen af den nationale økonomi i fremtiden,
- mangel på definerede nøgledata færdigheder er en hindring for yderligere faglig udvikling af både akademisk personale og studerende,
- på grund af stor informationsmængde tilgængelige der er en mangel på tid til at søge efter vigtige / udvalgte oplysninger, der ville gøre det muligt for træning af data færdigheder og faglig udvikling.

EMNE OG MED HENBLIK PÅ FORSKNING

Emnet for forskning er betydningen af dygtige håndtering af data. Hovedformålet med projektet er at skabe en generation af data Toolkit, der vil give de nuværende og kommende studerende, såvel som de videnskabelige medarbejdere til at øge kendskabet til, hvad moderne data færdigheder er. Projektet vil give en introduktion data færdigheder, som er både stringent og kongruent med akademisk og proprietær forskning, men også tilgængelig

og praktisk i naturen, således at interessenterne organisation og HE organisationer kan finde det direkte relevant for de muligheder og udfordringer.

Projektet vil gøre det muligt at opnå følgende mellemliggende forskningsmål:

- definere de data management grene,
- definere de nuværende kompetencer og færdigheder underskud af HE lærere / foredrag og studerende i de deltagende lande,
- definere hovedkomponenter det politiske miljø med hensyn til data færdigheder på EU- og nationalt og regionalt plan,
- definere effektive strategier til at undervise data færdigheder til studerende og iværksættere tidlige fase,
- definere efterspørgslen efter uddannelse blandt videnskabelige medarbejdere, styrke deres data færdigheder,
- skabe en smart data færdigheder undervisning model, herunder en læseplan, lærervejledning, lektionsplaner & foreslog indhold og læring motion

Projektet imødekommer behovene i de følgende aktører:

- Iværksætteruddannelse udbydere, som genkender big data er en vigtig tendens, men mangler forståelse af dets relevans for deres daglige arbejde, samt de pædagogiske strategier til at lære det til andre.
- stage iværksættere og undersøgelser management studerende (fremtidige iværksættere), der har brug for at vide, hvordan man opbygger data færdigheder i deres forretningsplaner Tidlige fra Hent gå, for at hjælpe udnytte markedsmulighederne.
- SMV-ledere (nuværende iværksættere), der har brug for at lære at dyrke deres smarte datakapacitet selv med begrænsede ressourcer.
- interessenter økonomiske udvikling, der har brug skalerbare strategier for opkvalificering vore befolkninger i data færdigheder og digitale kompetencer i almindelighed, for at sikre økonomier forblive konkurrencedygtige og de holder sig foran kurven.

I. FORSKNING DESIGN OG DATAINDSAMLING

Ifølge den metodologiske struktur, metoderne til indsamling af oplysninger præsenteret i Bord 3 nedenfor er blevet antaget i projektet.

Metoder til indsamling af viden	Forskningsområder	Formål
• akademisk forskning (tidsskrifter og publikationer) • online forskning (politik og praksis dokumenter) • direkte dataindsamling med målgrupper via undersøgelse • dybdegående interviews med projektpartnere og / eller case study kandidater	• færdigheder undersøgelse • politisk kontekst • bedste praksis	Analyser vil være nødvendigt at bestemme tilstanden af den aktuelle forskning, tilgængelige oplysninger, udveksling af erfaringer. De begreber, termer, antagelser og detaljerede beskrivelser vil blive analyseret. De vil også være grundlaget for sammenligning af de opnåede resultater og bemærkninger og kommentarer.

Bord 3: Metoder til indsamling af data

Metoden omfatter midler til at samle op-to-date information om alle tre indhold sektioner: færdigheder undersøgelse, kontekst politik og bedste praksis

- indsamling af oplysninger vil blive gennemført på grundlag af antagelser,
- modtageren af dataene vil blive fastlagt,
- specifikke spørgsmål vil blive defineret, som vi har til hensigt at få et svar.

Omfanget af aktiviteter for at udføre de opgaver, indsamling af oplysninger er:

- forskningsområdet skal defineres,
- værktøj og materialer, der er nødvendige for at gennemføre undersøgelsen, vil blive defineret,
- oplysninger om forskning materialer, såsom tilgængelighed, sprog, placering, der skal undersøges.

Med hensyn til dataindsamlingsværktøjer:

- softwaren og dens struktur for indsamling af oplysninger vil blive fastlagt,
- udvælgelse af data og detaljer regler vil blive fastlagt.

Efter udførelse af forskning, vil oplysningerne blive indsamlet og analyseret under anvendelse udvalgte metoder til viden forarbejdning, såsom: Induktiv og deduktive ræsonnement metoder[1], Analyse og sammenligning metoder[2], og kreativ tænkning metoder[3].

[1] Inductive and deductive reasoning methods described in article (G. Nandasenaa, L. N. K. de Silvab , K. K. W. A. S. Kumara, 2018, "Methods of Reasoning in Scientific Discovery, URL: http://asrjetsjournal.org/index.php/American_Scientific_Journal/article/download/3500/1360)

[2] Analysis and comparison methods (Sandra K. Hanneman, 2010," Design, Analysis and Interpretation of Method-Comparison Studies", URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2944826/)

[3] Creative thinking methods (Christian Kohls 2014, "COLLABORATION TOOLS AND PATTERNS FOR CREATIVE THINKING", URL: https://arxiv.org/ftp/arxiv/papers/1503/1503.01065.pdf)

II. ANALYSE AF TESTRESULTATERNE

GENSTAND FOR UNDERSØGELSE

Emnet for forskningen er analysen af data færdigheder blandt det videnskabelige personale og studerende fra de lande, som deltager i projektet. For de behov, empirisk forskning, blev en forskning hypotese formuleret: Der er mangel på data færdigheder blandt det videnskabelige personale og de studerende. En vigtig faktor, der påvirker forbedringen af data færdigheder blandt det videnskabelige personale er at fastlægge deres mangler og behov. De færdigheder for det videnskabelige personale relateret til effektiv datastyring have en indvirkning på kvaliteten af elevernes uddannelse og dermed kommende iværksættere. Forbedring af data færdigheder blandt det videnskabelige personale er bestemt af uddannelse, deres personlige og videnskabelige udvikling. Den præsenterede problem i relation til manglende data færdigheder blev undersøgt ved hjælp af et sæt af undersøgelser, som er opdelt i to spørgeskemaer,

Forskningen blev startet med en række grundlæggende beskrivende forskningsspørgsmål, som i tilfældet med det videnskabelige personale tilladt os at definere, om den undersøgte person fungerer som en akademisk lærer, baseret på erfaringer (anciennitet af lærere), og om han / hun beskæftiger sig med spørgsmål i forbindelse med forvaltning af data, og hvorfra partnerland han / hun kom fra. I tilfælde af studerende, de første spørgsmål lov til at definere, om det adspurgte person er studerende eller en begyndelse iværksætter og hvis de skulle behandle eventuelle datastrukturer og hvis han / hun allerede havde nogen emner relateret til datahåndtering.

Hovedformålene med undersøgelsen var:

- Identifikation af nuværende viden om det videnskabelige personale og de studerende med fokus på de emner, ifølge data færdigheder;

- Evaluering af undervisningen, og behovet for at forbedre de færdigheder i forbindelse med datahåndtering.

For at identificere den aktuelle viden blandt det videnskabelige personale og de studerende, har spørgsmål blevet bedt om at undersøge respondenternes kompetencer relateret til sådanne kategorier som smarte, data governance, datasikkerhed, informationssøgning, programmering færdigheder, online software usability, Software anvendelighed til læring eller undervisning formål. Det kontrolleres også, hvor mange respondenter bruger deres tid ved hjælp af udstyr, som er et værktøj til at generere og behandling af data.

For at vurdere undervisningen systemet relateret til datahåndtering, respondenterne udtryk for deres synspunkter på den aktuelle undervisning system emner relateret til datahåndtering, påpegede emner til at holde dem interesseret i at flere spørgsmål, og foreslog deres ideer til forbedring af data-læring.

FORSKNINGSMETODE

Mellem februar og april 2019 blev en empirisk forskning, der udføres blandt det videnskabelige personale og studerende fra lande og institutioner, der deltager i projektet (Letterkenny Institute of Technology (LYIT), University of Szczecin (US), Vilnius Gediminas Tekniske Universitet (VGTU), europæisk University Continuing Education Network (EUCEN), europæisk E-learning Institute (EUEI), Feltech Software Innovations Ltd (FELTECH)). Forudsætningerne af undersøgelsen er blevet diskuteret ovenfor. De institutioner, der deltager i projektet, fordelte spørgeskemaet elektronisk blandt det videnskabelige personale og de studerende. Forskningen var rettet mod at fastsætte størrelsen af de data færdigheder blandt det videnskabelige personale og de studerende, vurdering og bestemmelse af huller i de eksisterende undervisningssystemer,

FORSKNING PRØVE

I alt 469 mennesker deltog i den forskning, foretaget blandt det videnskabelige personale og de studerende fra partnerlandene i projektet, hvoraf 276 var studerende og blandt dem var også nogle unge iværksættere undersøgte, og 193 repræsentanter for det videnskabelige personale.

Den måde at konstruere spørgsmålene er tilladt i betydeligt omfang at svare på grundlag af din tro og forekomster af den nuværende viden om respondenterne. I undersøgelsen, hvor der var spørgsmål med bipolære svar, betyder det, at på de modstående kanter af skalaen er der modstridende overbevisning, anvendelsen af en 4-element målestok uden et neutralt sted, den såkaldte målestok af tvungen valg.

Undersøgelsen blev overværet af akademisk personale og studerende fra partnerlande, der deltager i de LYIT, USA, VGTU, EUCEN, EUEI og FELTECH projekter fra Irland, Nordirland og Litauen. Kriteriet for at deltage i undersøgelsen var at få en status på: akademisk personale, eller studerende og / eller er en ung iværksætter.

AKADEMISK PERSONALE

193 spørgeskemaer udfyldt af de videnskabelige medarbejdere består af 46 spørgeskemaer stilles til rådighed af USA, 40 af VGTU, 33 ved EUCEN, 32 ved LYIT, 1 af EUEI og 41 af FELTECH. De fleste mennesker fra det videnskabelige personale, der deltager i undersøgelsen har ti til tyve års anciennitet, seDiagram 1.

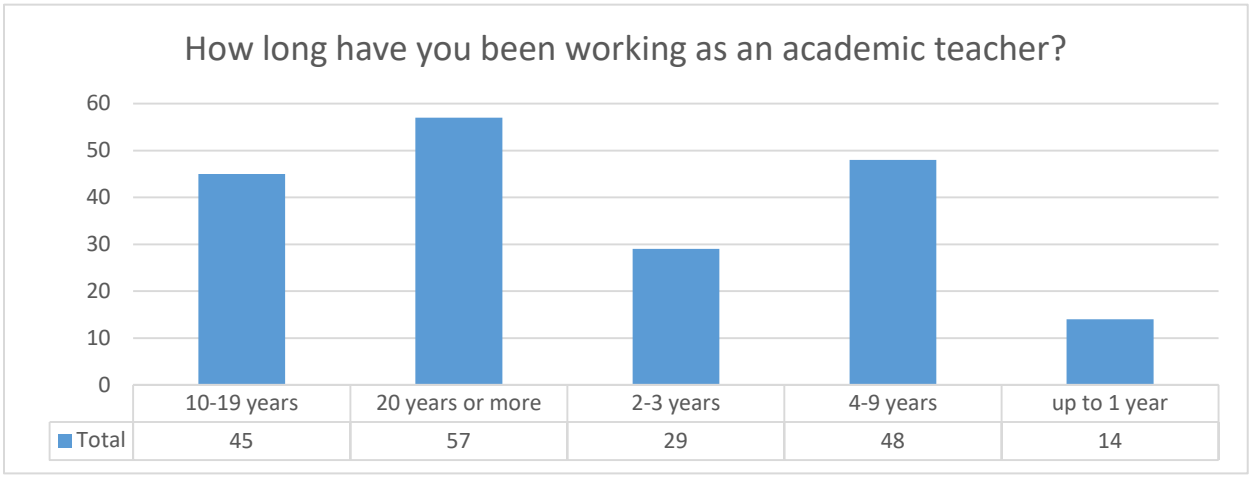


Diagram 1: Hvor længe har du arbejdet som akademisk lærer?

Blandt de adspurgte for det videnskabelige personale, kunne 19 nationaliteter skelnes, den mest talrige gruppe er den irske, polakker og litauere, se Diagram 2.

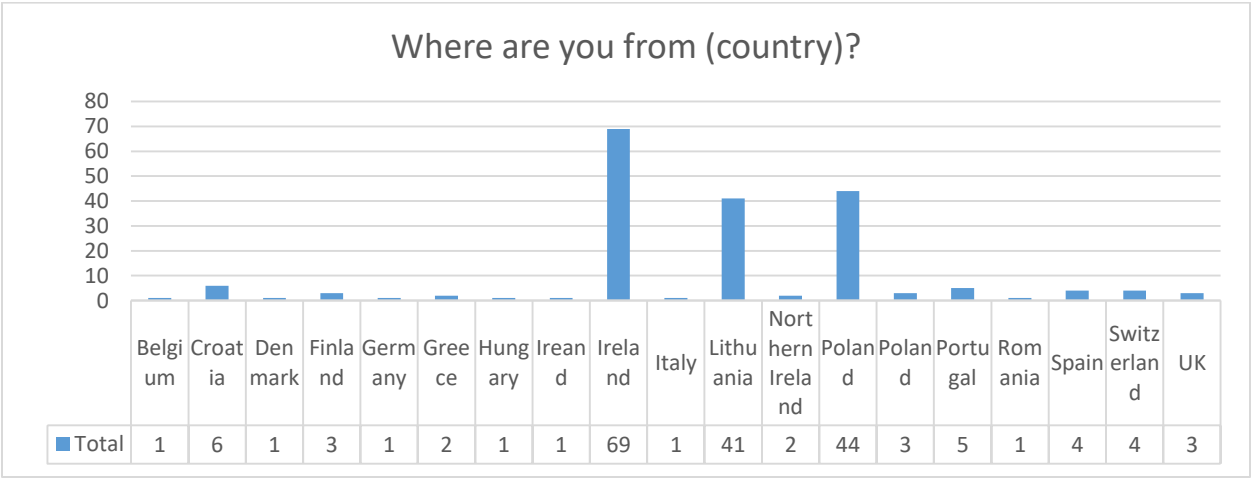


Diagram 2: Hvor er du fra (land)?

Det tredje spørgsmål var at kontrollere, hvor mange respondenter løb klasser relateret til datahåndtering. Over halvdelen ikke har gennemført denne type aktiviteter, seDiagram 3.

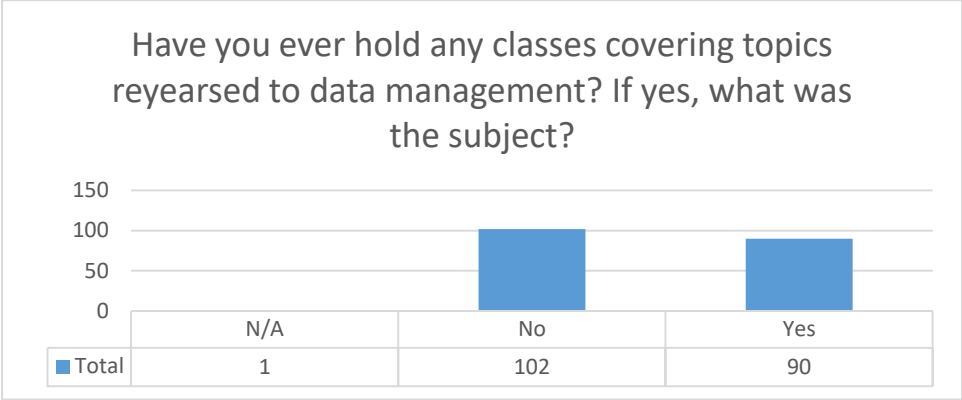


Diagram 3: Har du nogensinde holde nogen klasser, der dækker emner relateret til datahåndtering? Hvis ja, hvad var emnet?

Blandt de emner, der præsenteres i Bord 4Ved halvfems repræsentanter for det videnskabelige personale, der er emner som:

- *datavarehuse*
- *IT-systemer til forvaltning*
- *Database*
- *matematisk statistik*
- *Informationsteknologi*
- *Computer programmering*
- *Design informationssystemer*
- *Visualisering og grafik til lederen*
- *Data, visualisering og rapportering*
- *Geografiske informationssystemer*
- *HR og lønsystemer*
- *Introduktion til datalogi i erhvervslivet*
- *business Intelligence*
- *Analyse og design af informationssystemer*
- *Økonomistyring*
- *Research Methods, forskningsprojekter*
- *BNPR*
- *Data, strategi, og Datakvalitet*
- *Data Integration, datalagring*
- *Excel, Facebook,*
- *Google hjem, downloade software*
- *CRM-systemer, Project Management Systems*
- *Datastyring og datakvalitet*
- *Databeskyttelse, sikkerhed og dataadgang*
- *Data opbevaring*
- *Data og kommunikation forvaltningsplan*
- *Dataintegration, data regeringsførelse*

• *Arkitektur af edb-systemer, ERP business støttesystemer, CRM.* • *Facilities Management, BIM* • *Information management systemer* • *Firma datastyring* • *data analytics* • *Kvantitative beslutningsprocesser metoder* • *E-business* • *Information Security Management* • *Social Network Analysis.* • *Relationelle databaser og NoSQL Databaser* • *Big Dataanalyse* • *Videnskabelig programmering* • *indholdet Fysik* • *Management i uddannelse* • *Machine læring, dataanalyse, statistik* • *Bioteknologi* • *Deltagelse i uddannelse* • *Marketing*	• *Firma data, medarbejderdata management* • *Google Drev* • *deling af data* • *Data, tilladelse, udstationering, håndhævelse* • *Kunden dataindsamling, tracking online data* • *Optagelse kundekontakt oplysninger* • *rejse management kundedata* • *Kundedata for købsadfærden, Online data sociale medier analytics* • *At holde styr på marketing kampagner, online handelsdata, Abonnementdata management* • *Forskellige data management systemer* • *Kvalitetsstyring* • *Regnskabsdata, HR-data, indsamling og opbevaring* • *Private cloud-teknologier* • *Fotografering* • *Forretningsservice værktøjer og software*

Bord 4: Lærere, data- Emner

I det næste afsnit, har den viden og færdigheder for det videnskabelige personale inden for data management blevet kontrolleret. Diagrammerne nedenfor (Diagram 4 til Diagram 9) Fremlægge resultaterne af afsnittet Smart Data.

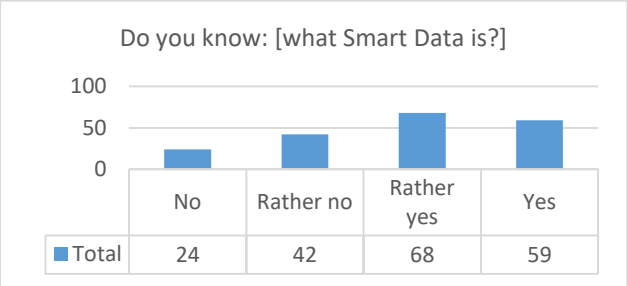


Diagram 4: Smart Data

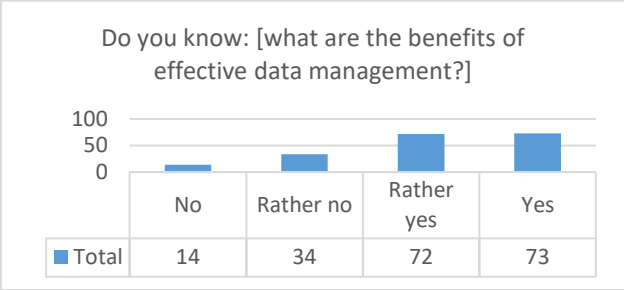


Diagram 5: Smart Data-effektiv datastyring

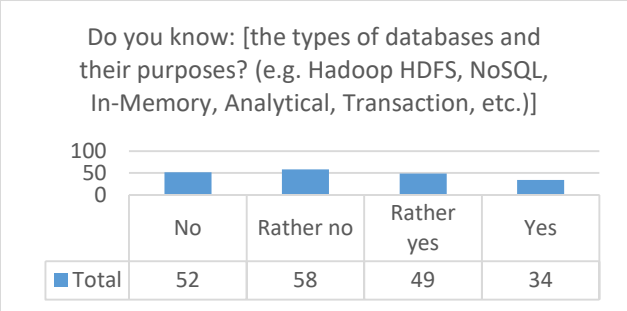


Diagram 6: Smart Data-effektiv datastyring

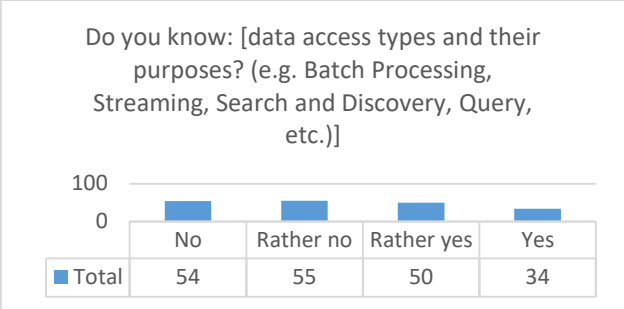


Diagram 7: Smart Data-dataadgang typer

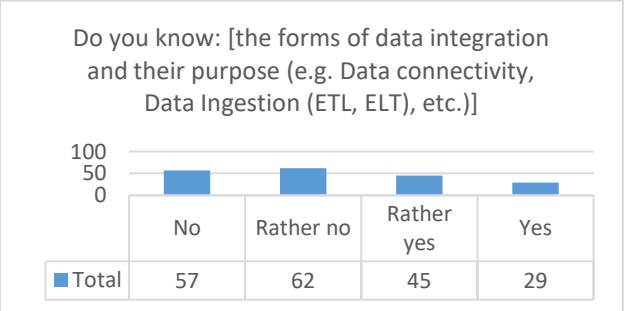


Diagram 8: Smart Data-former for dataintegration

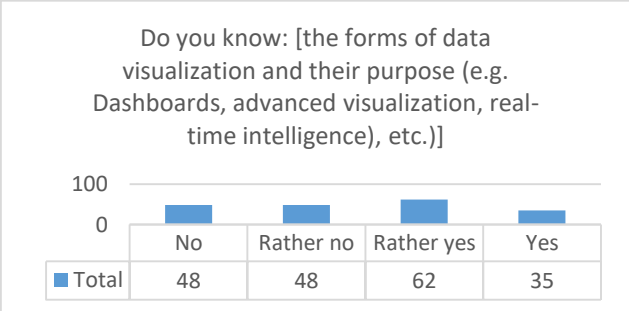


Diagram 9: Smart Data- former for data visualisering

Diagram 10præsenterer gennemsnittet af resultaterne af afsnittet Smart Data. De faglige personale kender deres viden på dette område i 30% så god, mens 26% af korrespondenter overveje deres viden utilstrækkelig.

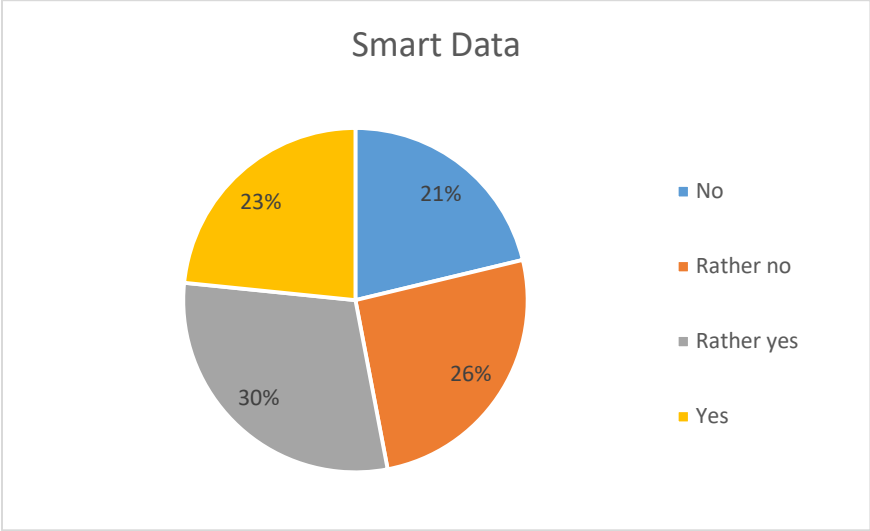


Diagram 10: Smart Data sektion gennemsnit

I det næste afsnit, har den viden og færdigheder for det videnskabelige personale inden for styring af data blevet kontrolleret. Diagram 11 til Diagram 21 fremlægge resultaterne af datasektionen styring.

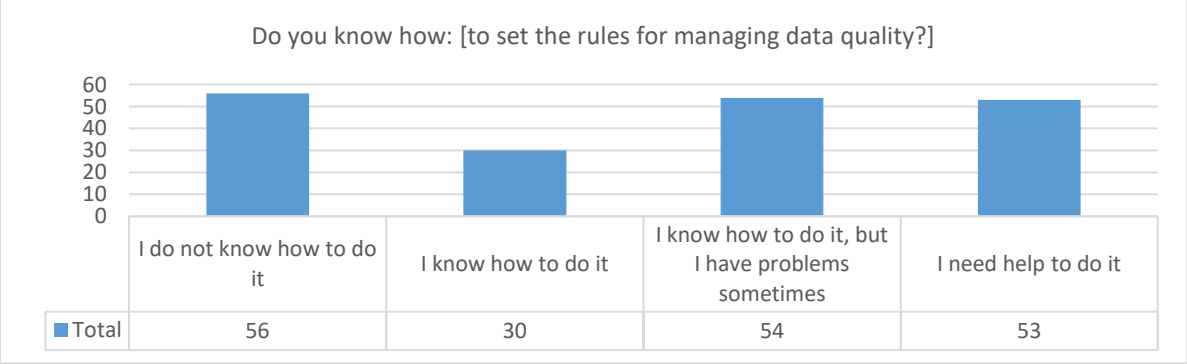


Diagram 11: Resultater af dataene regeringsførelsesrelaterede styre data kvalitet

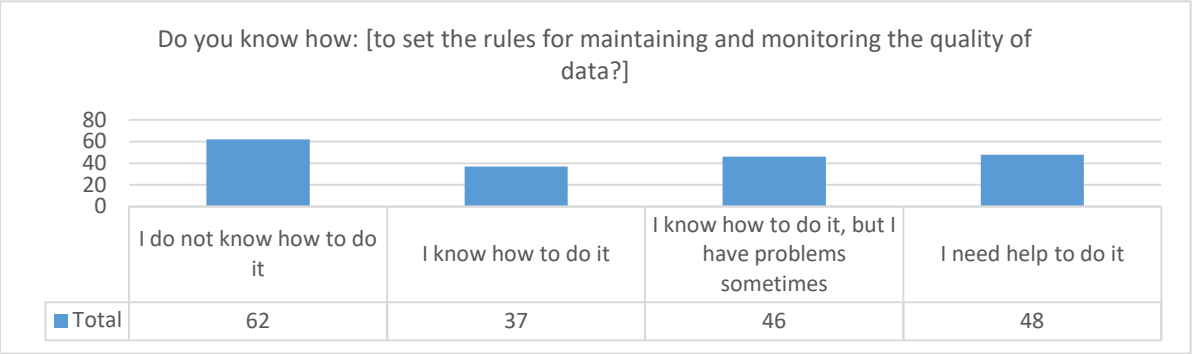


Diagram 12: Resultater af dataene regeringsførelsesrelaterede vedligeholdelse og overvågning af kvaliteten af data

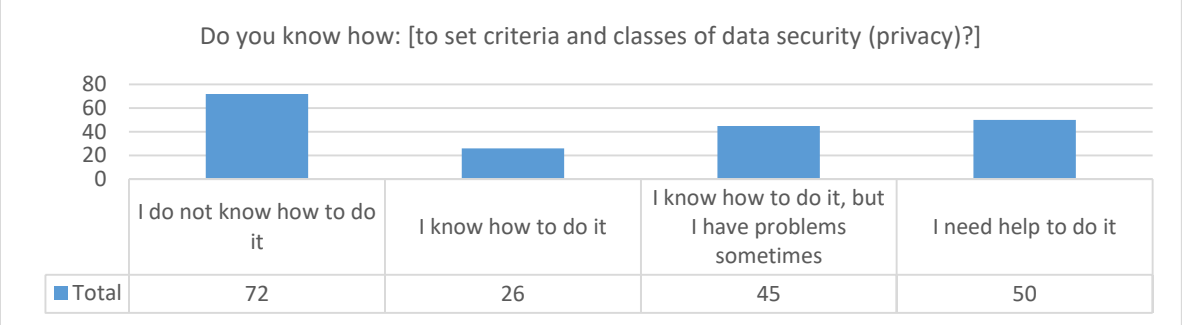


Diagram 13: Resultater af dataene regeringsførelsesrelaterede datasikkerhed (privatliv

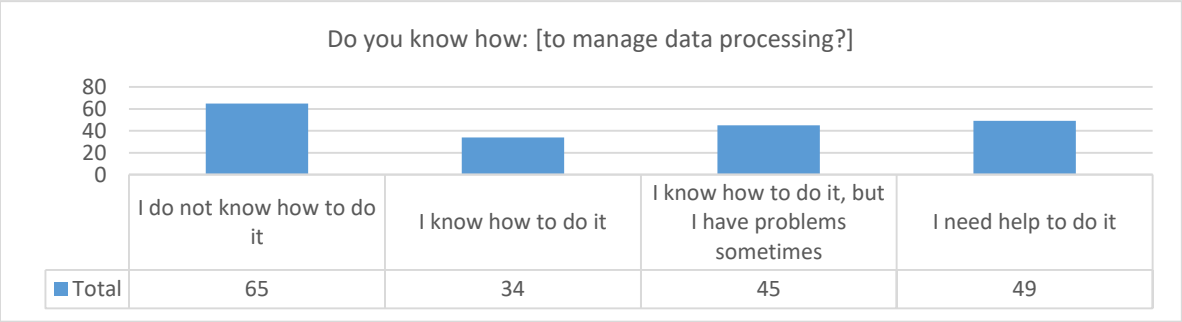


Diagram 14: Resultater af dataene regeringsførelsesrelaterede databehandling

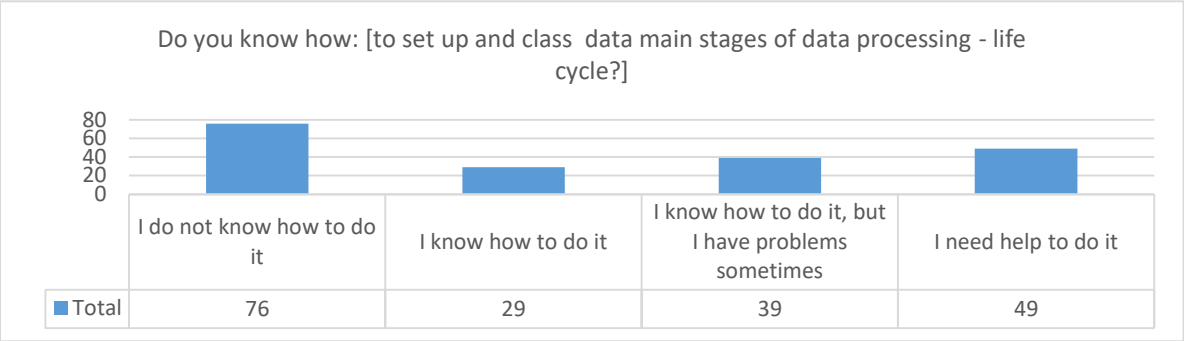


Diagram 15: Resultater af dataene regeringsførelsesrelaterede databehandling - livscyklus

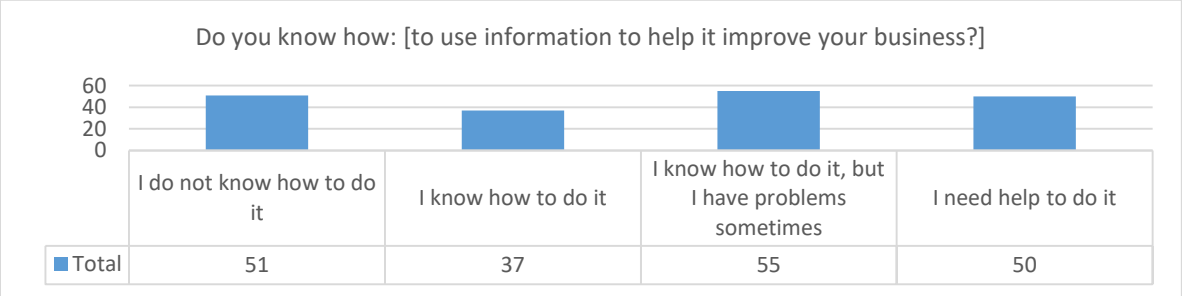


Diagram 16: Resultater af data governance-forbedring virksomhed

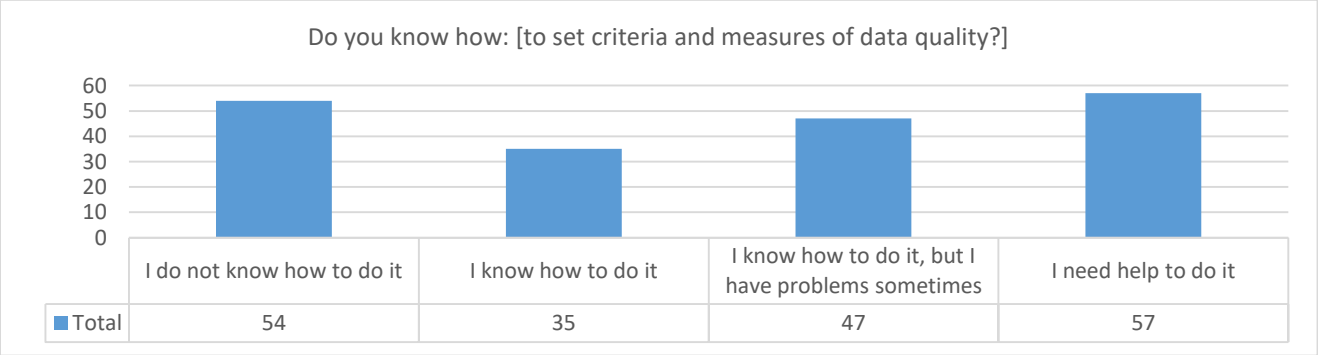
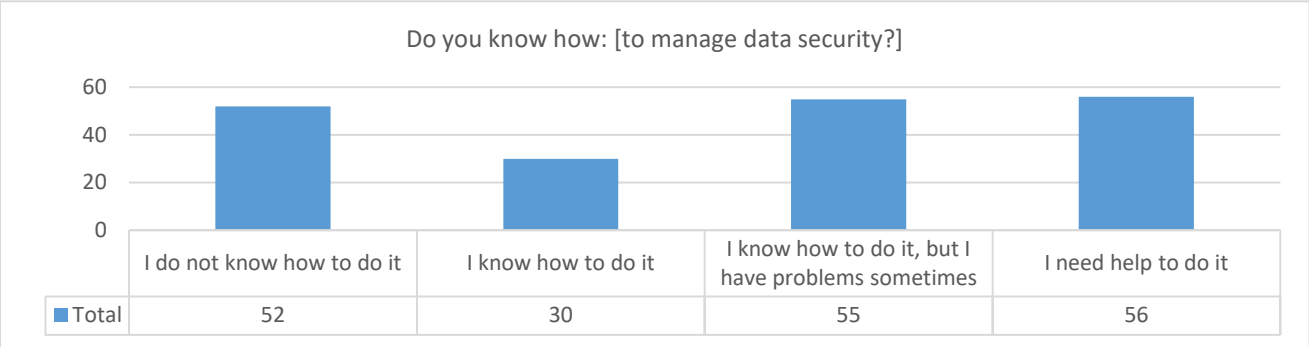


Diagram 17: Resultater af data governance -data kvalitet



Figur 18: Resultater af sikkerhed data governance-data

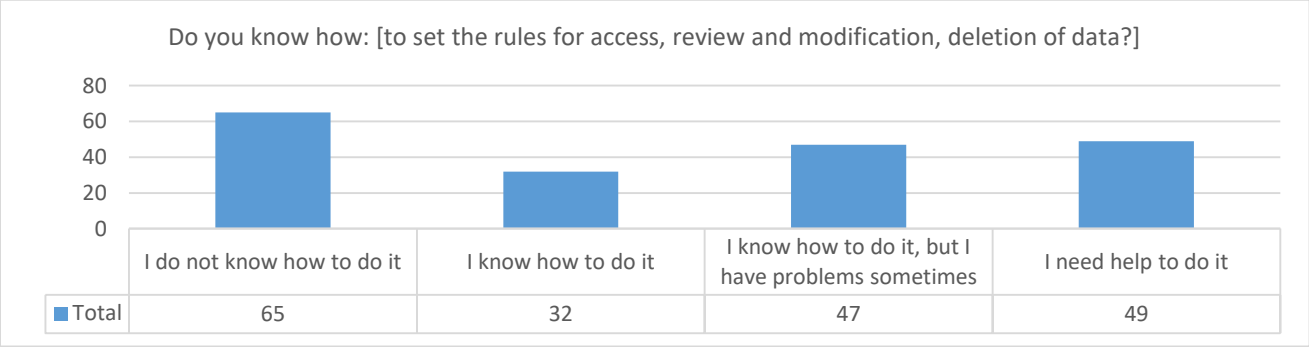


Diagram 18: Resultater af data regeringsførelsesrelaterede for adgang, revision og ændring, sletning af data

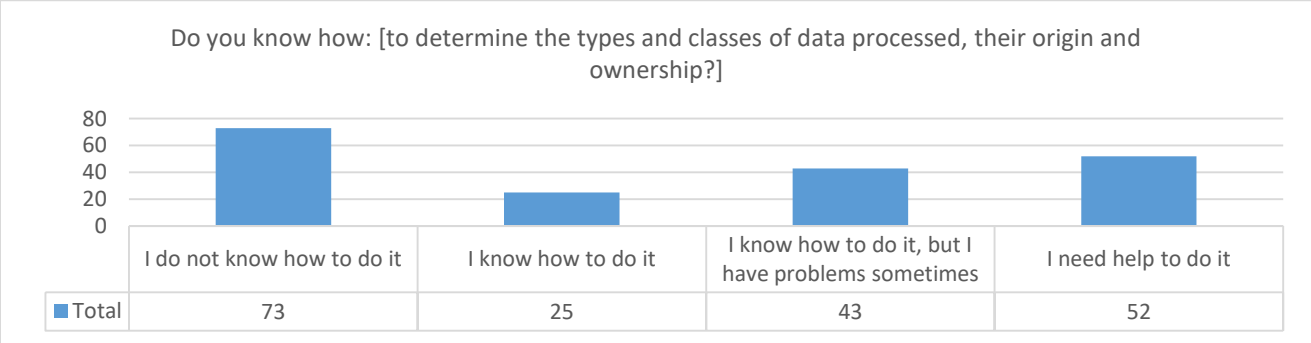


Diagram 19: Resultater af dataene regeringsførelsesrelaterede typer og klasser af data behandlet, deres oprindelse og ejerforhold

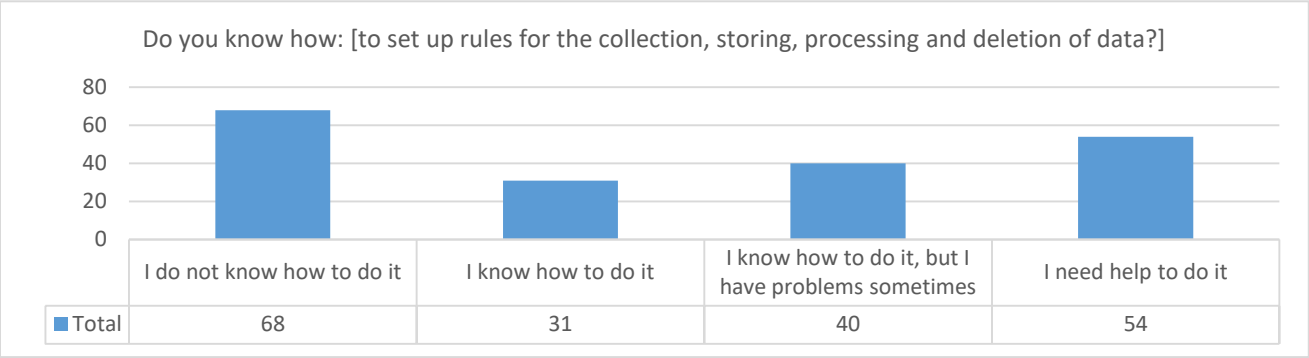


Diagram 20:? Resultater af dataene regeringsførelsesrelaterede indsamling, lagring, behandling og sletning af oplysninger]

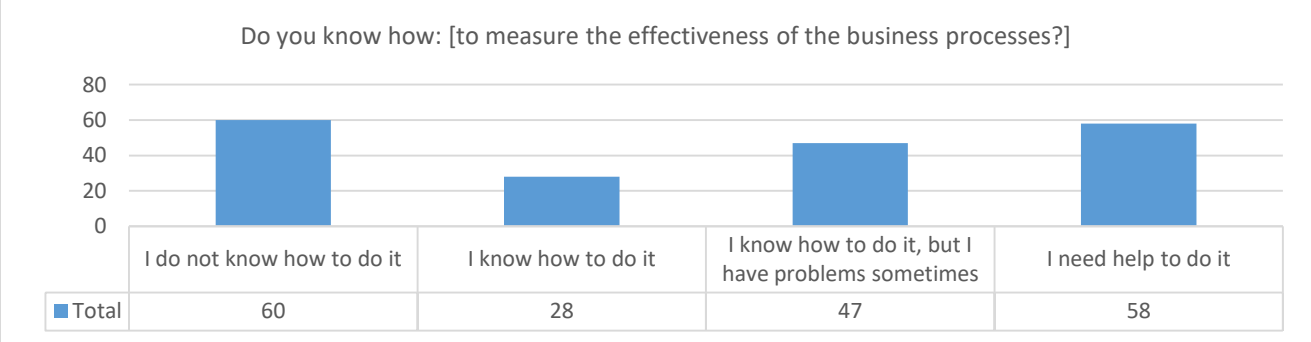


Diagram 21: Resultater af dataene regeringsførelsesrelaterede måle effektiviteten af forretningsprocesserne

Diagram 22præsenterer gennemsnittet af resultaterne af afsnittet Data governance. Akademisk personale i 33% angiver manglende færdigheder på dette område, og 27% på grund af manglende kompetencer.

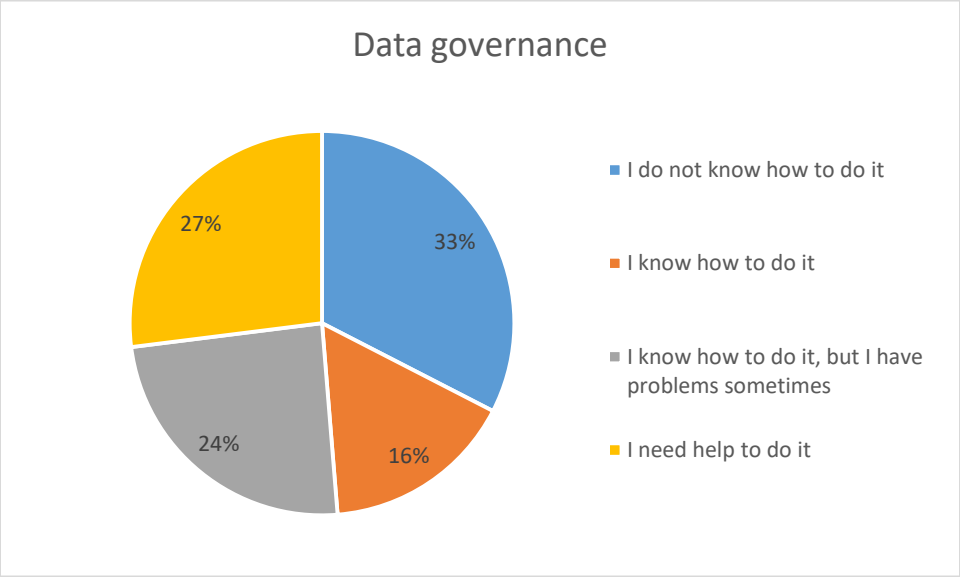


Diagram 22: Gennemsnitlig - Data governance

Diagram 23præsenterer gennemsnittet af resultaterne af afsnittet Datasikkerhed. Det faglige personale i 31% angiver gode evner på dette område, og 27% på grund af manglende færdigheder

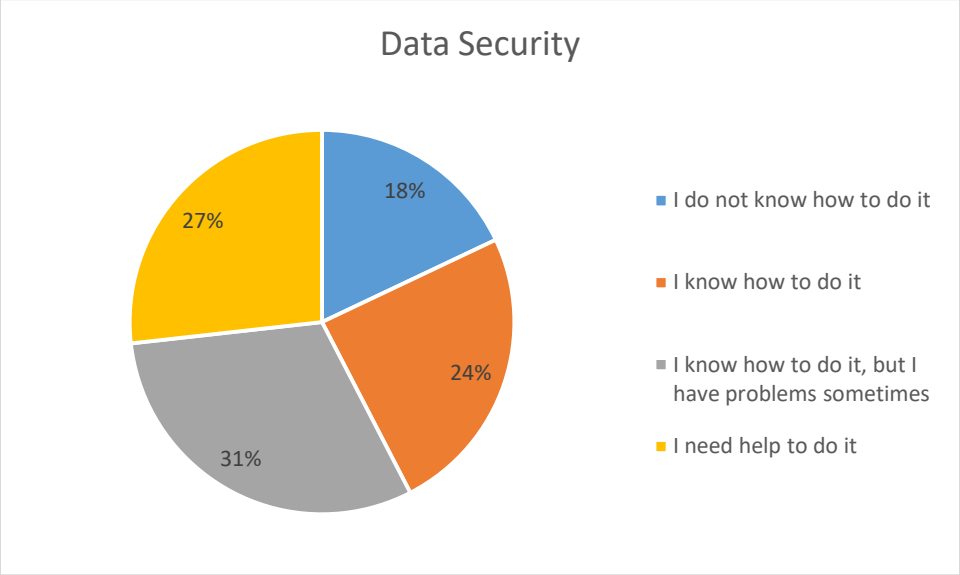


Diagram 23: Gennemsnitlig - Datasikkerhed

Diagram 24præsenterer gennemsnittet af resultaterne af at søge efter oplysninger sektion. Det faglige personale i 51% angiver meget gode færdigheder på dette område.

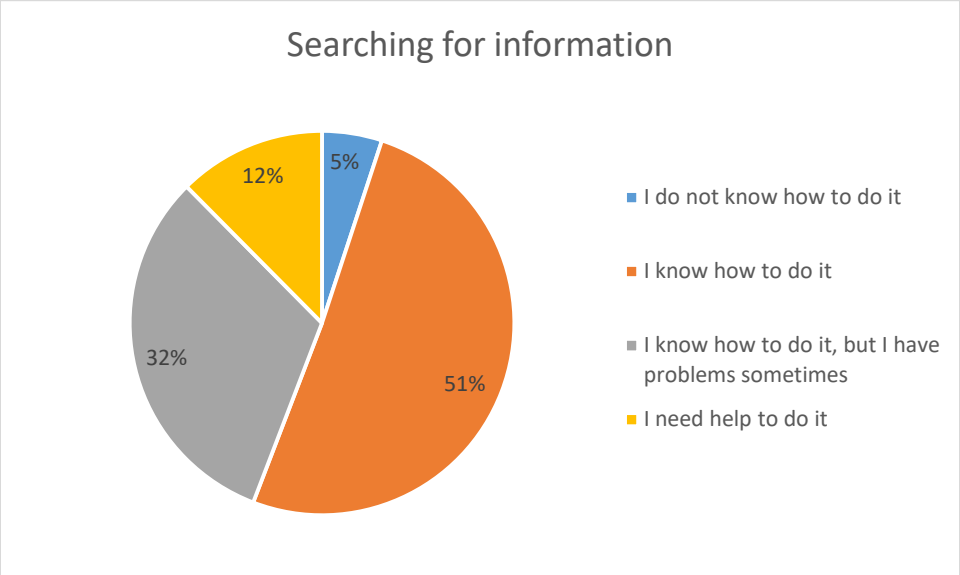


Diagram 24: Gennemsnitlig - Søgning efter oplysninger

Diagram 25præsenterer gennemsnittet af resultaterne af afsnittet Software færdigheder. Akademisk personale i 34% angiver gode færdigheder på dette område, 25% af de adspurgte har problemer med software aktiviteter.

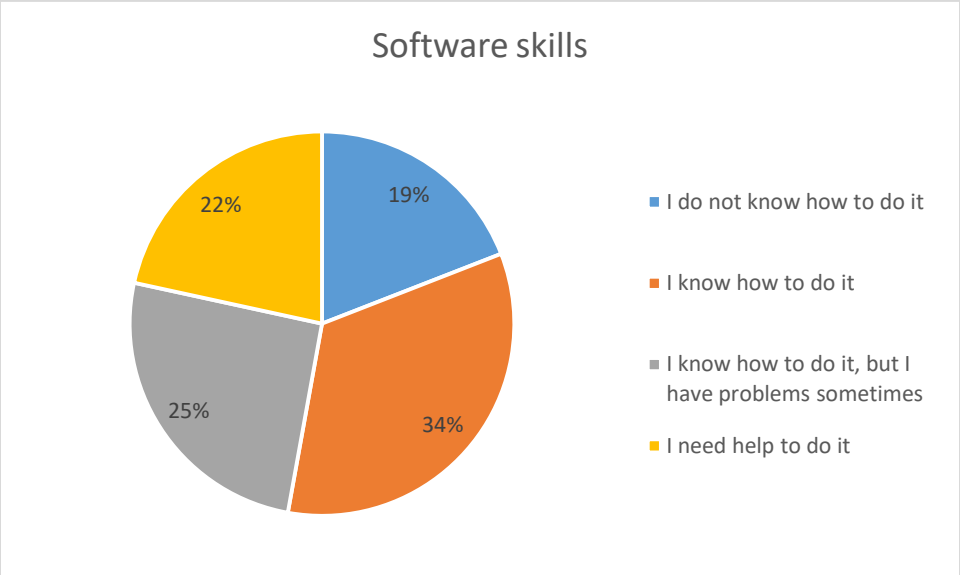


Diagram 25: Gennemsnitlig - Software færdigheder

Diagram 26præsenterer gennemsnittet af resultaterne af den online software usability sektion. Akademisk personale i 42% angiver meget gode færdigheder på dette område og 31% af de adspurgte fik gode færdigheder med online software aktiviteter.

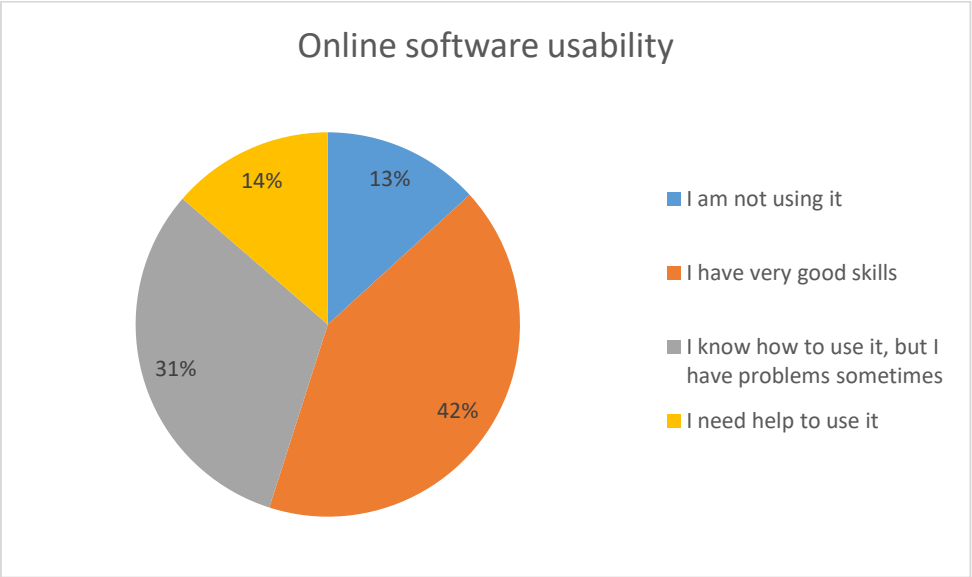


Diagram 26: Gennemsnitlig - Online software usability

Diagram 27præsenterer gennemsnittet af resultaterne af softwaren anvendelighed til læring eller undervisning formål sektion. Akademisk personale i 35% angiver problemer med at bruge software til undervisningsbrug, mens 23% mener, at de har meget gode færdigheder.

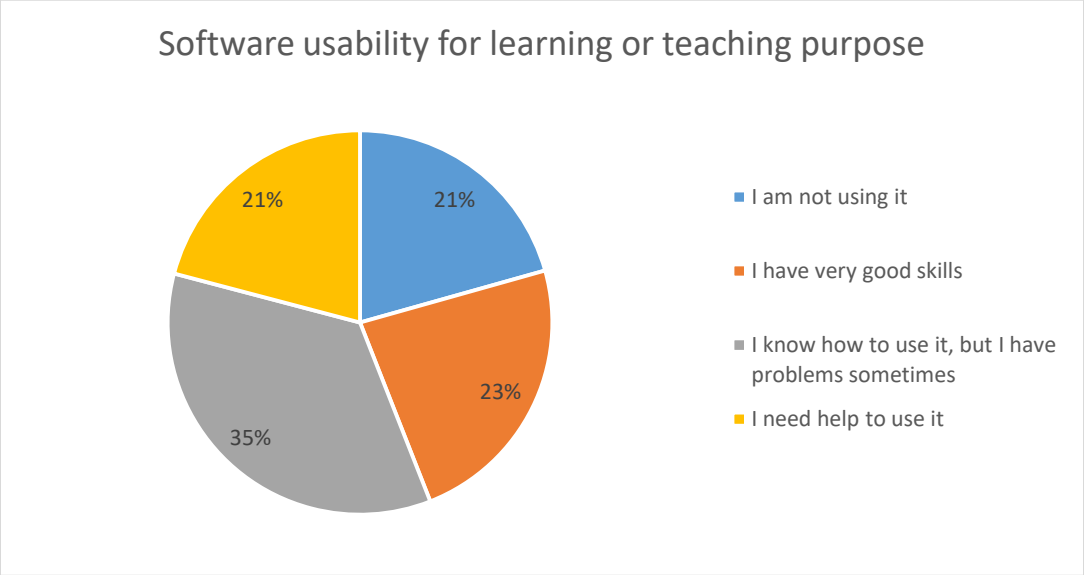


Diagram 27: Gennemsnitlig - Software anvendelighed for læring eller undervisning formål

Diagram 28præsenterer gennemsnittet af resultaterne af Tid brugt med digitale enheder sektion. Over 49% af det videnskabelige personale erklærer brug af elektroniske apparater af forskellige typer mindre end en time om dagen, 22% af de adspurgte anvende elektronisk udstyr mere end 4 timer om dagen.

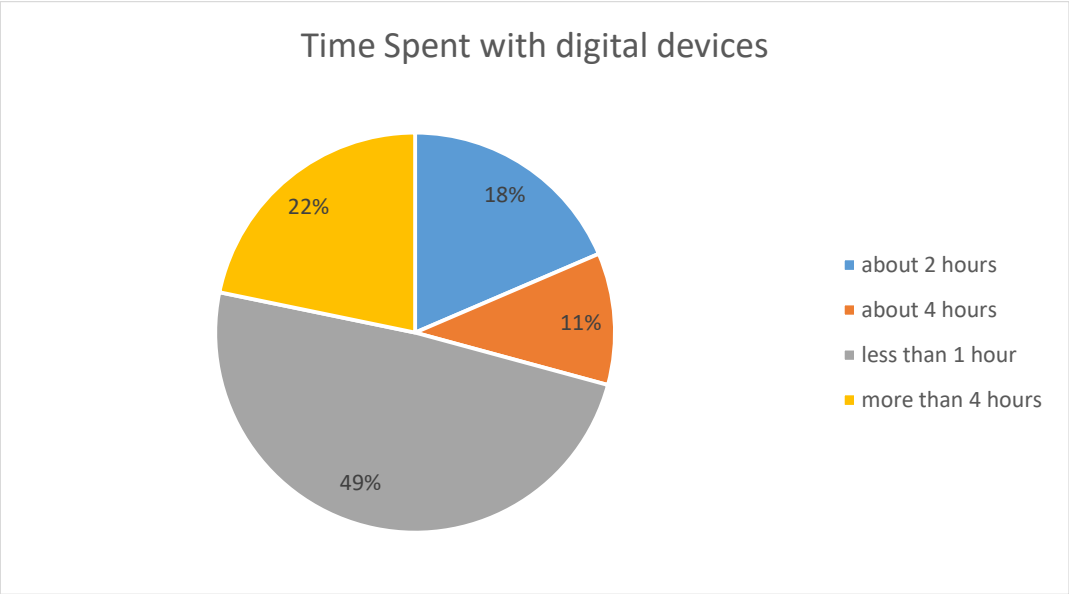


Diagram 28: Gennemsnitlig - Tid brugt med digitale enheder

Diagram 29præsenterer gennemsnittet af resultaterne af undervisningen sektion. Over 29% af de adspurgte erklærer problemer i forbindelse med udvikling af undervisningsmateriale processer i forbindelse med håndtering af data, en anden 29% angiver, at de har brug for hjælp på dette område.

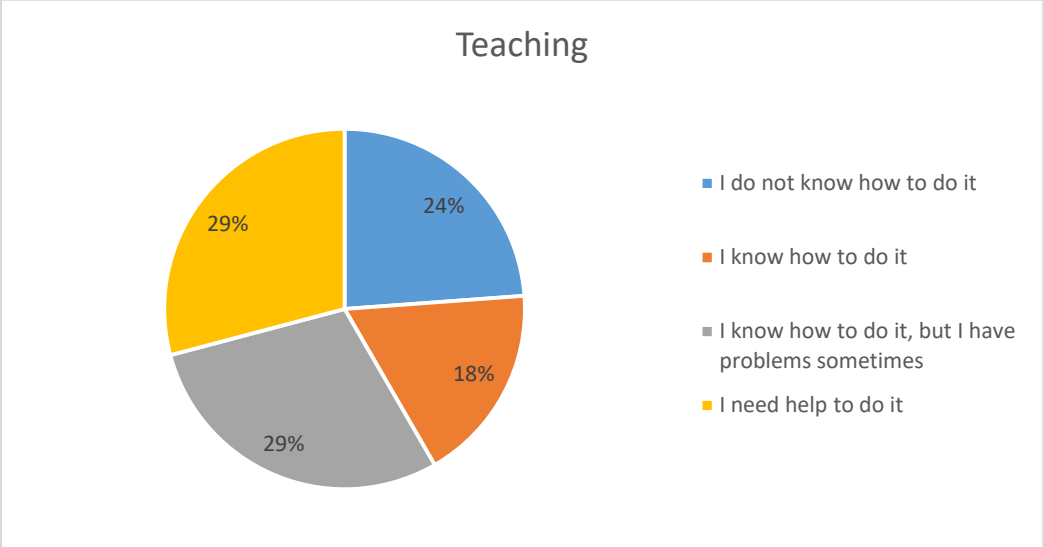


Diagram 29: Gennemsnitlig - Undervisning

Diagram 30præsenterer resultaterne af spørgsmålet: Hvordan vil du vurdere den aktuelle studieordning med hensyn til data management spørgsmål? 101 respondenter erklæret svagheder i læseplanerne relateret til emnet for data management, og 25 mennesker erklærede, at der ikke er behov for indblanding i nuværende studieordning.

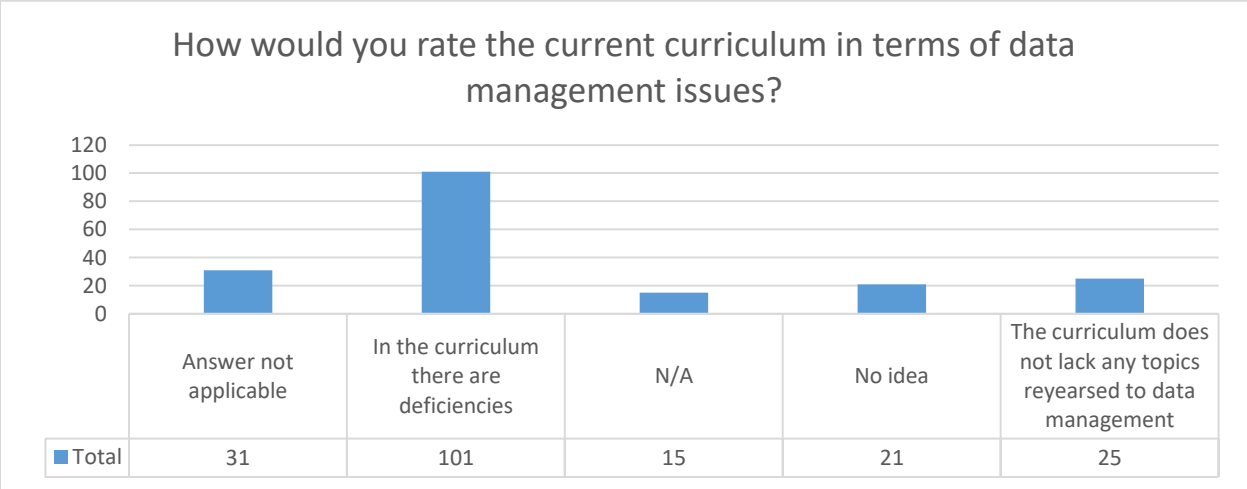


Diagram 30: Hvordan vil du vurdere den aktuelle studieordning med hensyn til data management spørgsmål?

Respondenter, der erklærede mangler i den foreslåede tilføje følgende emner til pensum pensum:

• *Teoretiske grundlag for lagring og behandling af data* • *Emner relateret til bygge bevidsthed om konsekvenserne af automatisering* • *Mere praktiske aktiviteter for studerende* • *Mere praktiske oplysninger* • *E-learning værktøj, mere digital brug og online kurser for fremme af studerendes mobilitet* • *relaterede emner* • *Data management emner* • *Big data management, cloud computing emner* • *Yderligere emner for ikke-IT uddannelser data management* • *Data analytics, søgning af data* • *Cloud computing, data analytics* • *Datasikkerhed emner* • *Emner om data management spørgsmål* • *Skyen* • *Integration af datahåndtering i*	• *Data regeringsførelse og Ludoliteracy* • *BI, Semantic Web* • *Datasikkerhed og data regering* • *SQL Script* • *Blended learning* • *Digitale og forvaltning af data kompetencer, der tilbydes af skolen som et supplement af indledende eller ajourføringsuddannelse* • *Digitale kompetencer* • *Styring og lagring af data* • *Oplysninger om datastyring* • *Datasikkerhed og grundlæggende IT-færdigheder* • *Praktisk træning* • *Sikkerhed, meta data management, datalagring, data rengøring* • *Større behov med hensyn til datahåndtering og hvordan man kan integrere den i pensum*

virksomhedsledelse • *Emner om beskyttelse og sikkerhed privatliv* • *Big data (virksomhedsledelse)* • *Hvordan man laver forretning mere effektiv* • *Sådan integrerer data management i forretningsprocesser?* • *Datasikkerhed, forarbejdning og data regler og forskrifter* • *Metadata, data strategier, Content management, analytics og beskyttelse* • *Ophavsret og licenser* • *Dataene har brug for forskellige typer af virksomheder og for iværksættere* • *Data, behov og foreslog ved opsætning af en virksomhed fx sikkerhedskopiering af data, lagring af data, data relationer* • *Teknologi og fremtidige enheder og software er nødvendig for datahåndtering* • *Datastyring konsekvenser, sikkerhed og politik i Europa* • *Software, analyse og integration* • *Data mining, rengøring og opbevaring af data* • *strategier datastyring forskellige eksempler og hvordan hver arbejde* • *Data, software, undervisning, optagelse, offentlige rettigheder og BNPR* • *Forskellige teknologier er nødvendig for at levere forskellige data emner* • *Datakvalitet og kontrolforanstaltninger, systemer om, hvordan man holder styr på dine data og data management praksis* • *Data, ekspertise og teknologier*	• *behandle overdreven kultur af dataindsamling, raffinering og opdatering praksis datastyring* • *Hovedsageligt datadeling, distribution og sikkerhedsstyring* • *Mere varierede emner specifikke for iværksættere* • *Curriculum er ikke up to date, og ikke nok casestudier fra virkelige virksomheder* • *Til forvaltning af kunderelationer, bedste software-værktøjer, software implementering* • *Forskellig praksis for forskellige typer af iværksættervirksomheder data management* • *Data, strategi, kvalitetskontrol, data management køreplaner,* • *Data strategier udvikling* • *Governance og datastyring kvalitet* • *Data, arkitektur, livscyklus og applikationer* • *praksis data forbedring* • *Data, software og hvad der er bedst, hvorfor og hvorfor det er den bedste praksis* • *data applikationer* • *Data mining, semantik, rapportering* • *Batch rapportering, visualiseringer, metadata, administrerende datakvalitet* • *Sådan bruger Excel i fremskredne stadier og data indtagelse*

Bord 5: Mangler i pensum-foreslåede emner

I det næste spørgsmål blev respondenterne spurgt om, hvad problem, de ser i det nuværende system med uddannelse relateret til, præsenteres iDiagram 31 til Diagram 37:

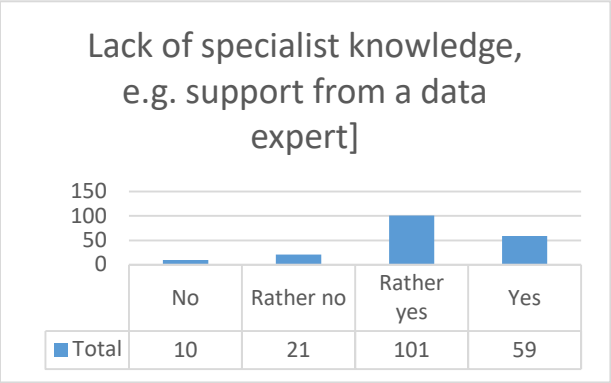


Diagram 31: Mangel på specialistviden

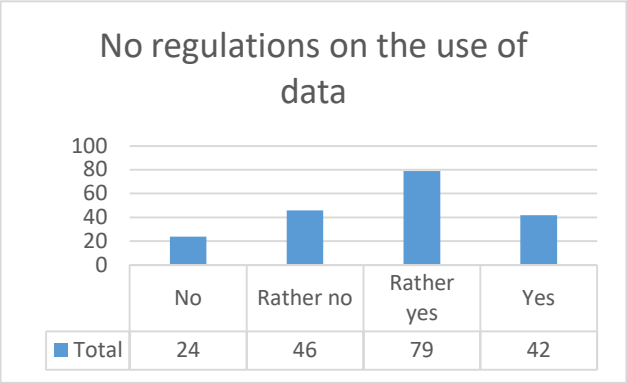


Diagram 32: Ingen regler om brug af data

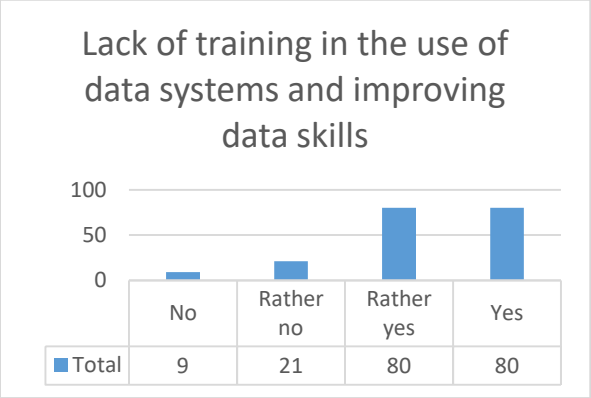


Diagram 33: Mangel på uddannelse

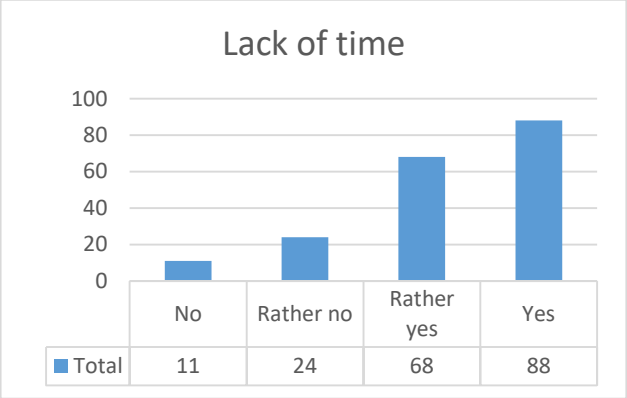


Diagram 34: Mangel på tid

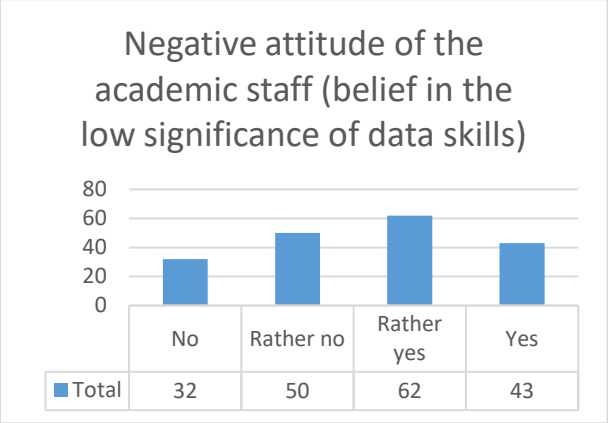


Diagram 35: Negativ holdning af videnskabelige medarbejdere

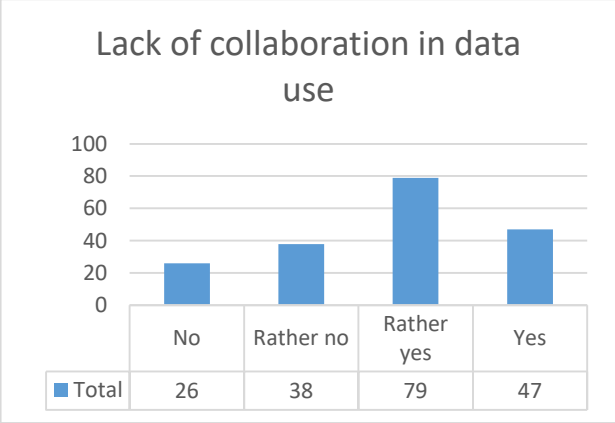


Diagram 36: Manglende samarbejde i brug af data

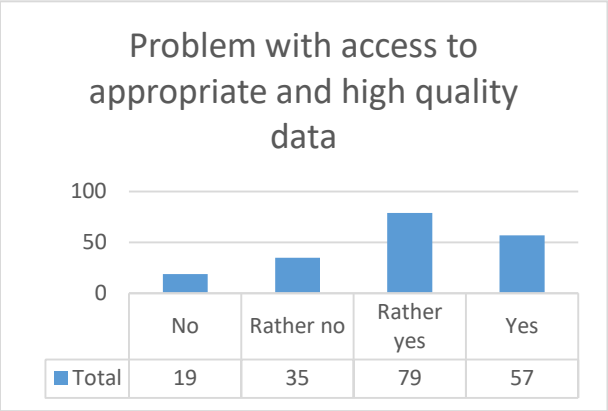


Diagram 37: Problem med adgang til passende og data af høj kvalitet

Det Diagram 38 angiver, hvor akademisk personale vil anvende den viden om data.

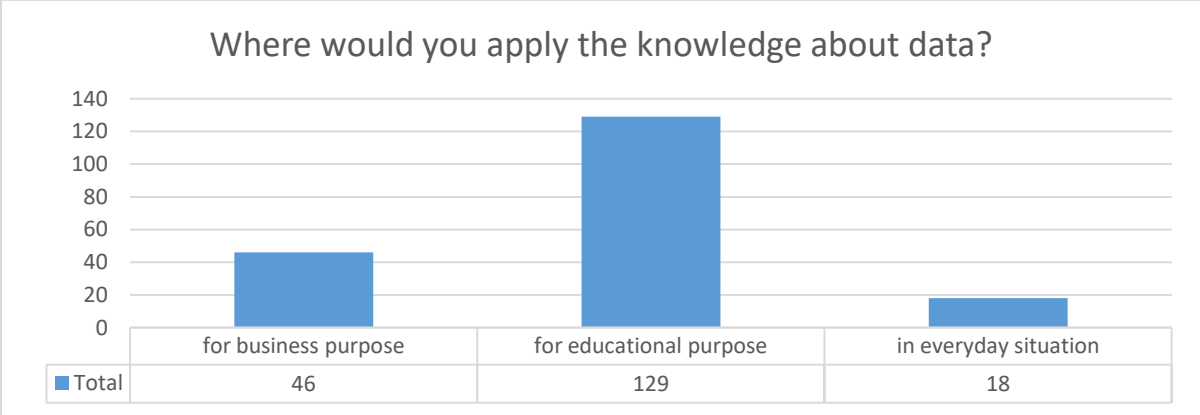


Diagram 38: Anvendelse af viden om data

I det næste afsnit, det videnskabelige personale besvaret spørgsmålet: Hvilke emner relateret til datahåndtering er vigtige og / eller bør være omfattet af undervisningspligten? (1 - mindst betydende, 6 - mest signifikant), seDiagram 39 til Diagram 44.

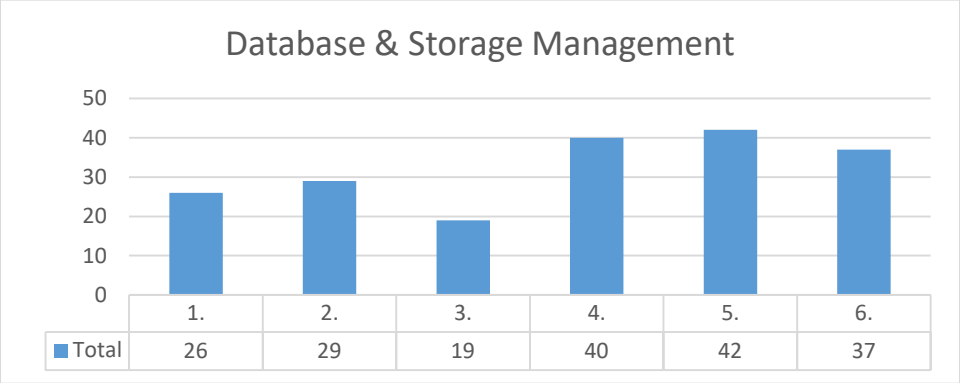


Diagram 39: Database & Storage Management

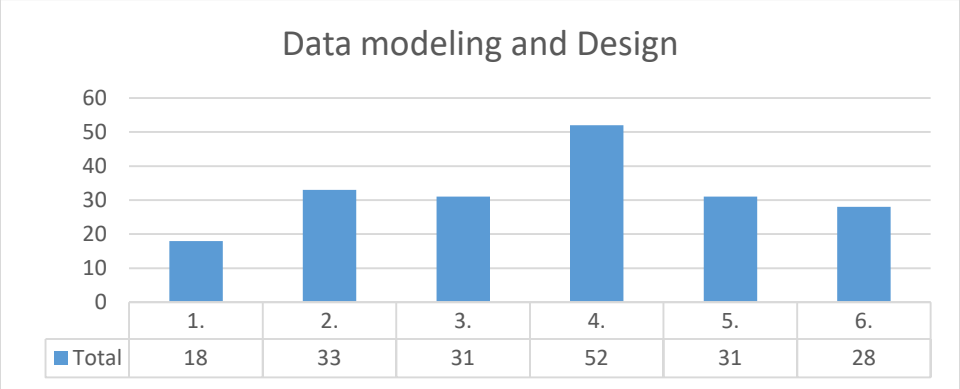


Diagram 40: Data modellering og design

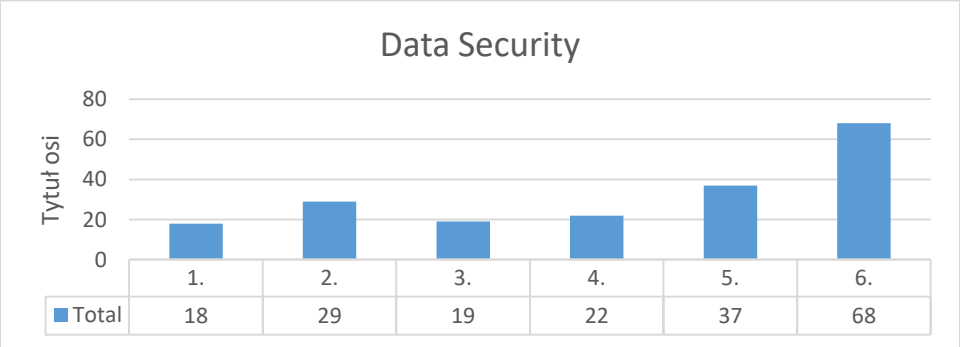


Diagram 41: Datasikkerhed

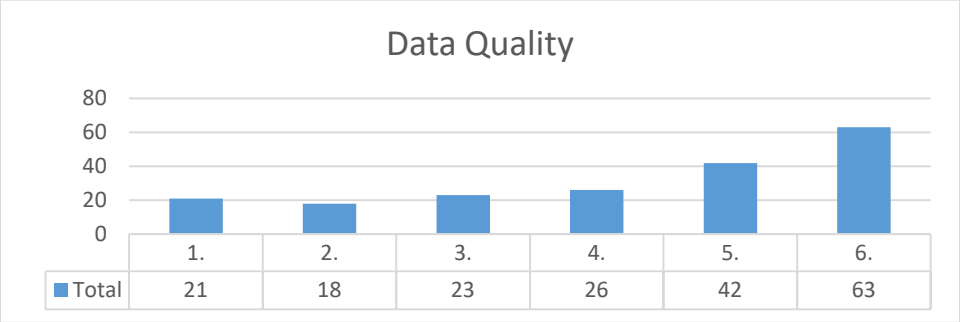


Diagram 42: Data Quality

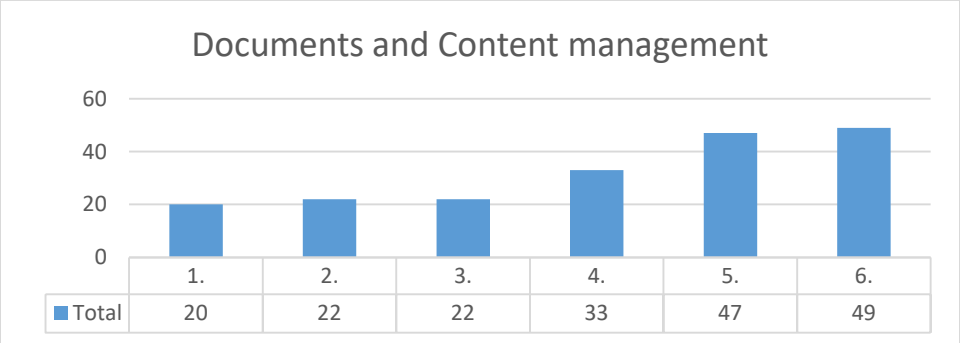


Diagram 43: Dokumenter og Content management

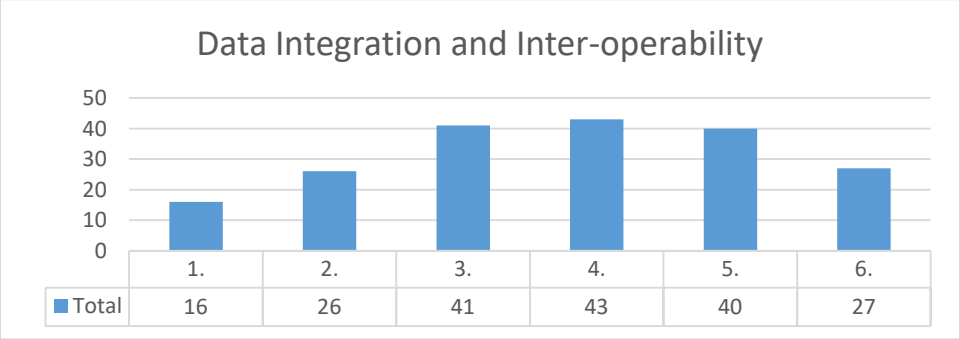


Diagram 44: Data Integration og Interoperabilitet

I det næste afsnit, det videnskabelige personale besvaret spørgsmålet: Hvad i din mening kunne forbedres i undervisningen om data ?, seBord 6.

• *Mere tid* • *Indføre passende fag på niveau med gymnasiet og universitet uddannelse*	• *Giv os de rigtige værktøjer og ajourførte oplysninger, der vil være i stand til at anvendes globalt for iværksættere i*

• *Klar sprog* • *Fremgangsmåder til opnåelse af forskellige data* • *Øg integritet og ensartethed af undervisningens indhold er forbundet med data inden for forskellige emner, behandling af data-læring som en omfattende, men fragmenteret proces* • *mere fri træninger* • *Case study* • *Sæt ord til handling* • *Udvikling af kompetencer inden for kritisk tænkning i processen med at søge information* • *Mere praktiske øvelser* • *Oprettelse tutorials, møder med eksperter, hjemmesider med data, som du kunne drage fordel af klasserne* • *Analyse og følgeslutning - casestudier* • *Flere praktiske øvelser inden for data mining* • *Vis og bruge moderne søgemønster værktøj eller datalagring og angive deres ansøgning kan være nyttigt i den professionelle karriere af studerende.* • *Et stort antal eksempler på reelle data* • *Mere praktiske eksempler og anvendelsesmuligheder* • *Øge antallet af undervisningstimer for modellering og datastyring* • *Ved træning undervisere (forskere) og studerende* • *Der er ikke noget entydigt svar* • *Indføre flere evalueringsprojekter* • *Anerkendelse og erhvervelse af data* • *Yderligere kurser nødvendige* • *For at bruge mere tid på dette emne.* • *Hvis du vil dele flere oplysninger med andre universiteter / virksomheder.* • *Færdigheder af lærere og studerende* • *For at tilføje undervisningen for underviserne at forbedre deres viden (især datasikkerhed)* • *At organisere flere foredrag for undervisere og administrativt personale.* • *Grundlæggende informationer for alle* • *At give oplysninger om datahåndtering til andre uddannelser* • *Mere uddannelse på datasikkerheden* • *Der bør gives mere praktiske oplysninger fra erhvervslivet til at gøre disse undersøgelser mere attraktivt for studerende* • *Inviter undervisere fra andre uddannelser.*	*arbejdsmiljøet verden* • *Hvad er de aktuelle data management emner, og hvad skal jeg undervise der er så meget information, og sørg for det er gældende for Irland og iværksættere i Irland* • *Sørg for vi giver det rette indhold for iværksættere, der er egnede til vores land har brug for, og de typer af virksomheder, vi har f.eks landbrug og fødevarer er meget stærk i Irland* • *Vi er nødt til at organisere data management emner i vores undervisning bedre og gøre dem mere relevante for iværksættere* • *Vores indhold stadig ikke dækker nok af de emner, der er nødvendige, og i nok afd især for iværksættere, der måske ikke modtager inkubation støtte* • *Giv os de bedste værktøjer, der er nemme at bruge for data undervisning, der er up to date specifikke for iværksætternes behov* • *Jeg er ikke blevet uddannet til at undervise i et program modalitet og enhver iværksætter er anderledes med forskellige kompetencer og baggrunde, hvis jeg kunne være mere fleksible til deres behov* • *Jeg farer vild i alle de data management emner jeg tror der skal være en balance mellem datastyring for iværksætteren og iværksættere forretningsbehov* • *En masse af data management er ikke nødvendig, såsom de tekniske aspekter, vil jeg gerne se mere med mere af en fokusering iværksætter indhold* • *Bring i mere projektbaseret læring, så iværksættere kan føre deres egen læring, kommer til at tænke mere og bruge retningslinier bedre, der virker for deres virksomhed* • *Behov for at medtage spil baseret læring for hukommelse fordele, når det er nødvendigt, godt at få et par iværksættere, der arbejder sammen i quizzer, afstemninger mv*

• *For at tilføje flere emner i forskellige (også sociale) uddannelser* • *For at tilføje nye undersøgelse moduler, der hver elev kunne vælge og studere dem.* • *Hvis du vil bruge de nye værktøjer i universitetets daglige situation.* • *Kvaliteten af data management uddannelser* • *Vi taler for lidt om big data betydning og dens betydning for en bedre kvalitet af business management processer.* • *Måske flere relaterede emner, der skal føjes til de eksisterende uddannelser?* • *Mere uddannelse på dette* • *At lære, hvordan data management forbedrer virksomhed* • *Jeg tror, at disse emner er nødvendige for hver person, så vi bør undervise disse emner på universitetet* • *At integrere undersøgelse moduler i Business Studies* • *Mere information* • *Mere tid og moduler afsætte til dette.* • *Der er meget, der skal forbedres i at bruge data i almindelighed, fra at forstå konsekvenserne af deling af data til at værdsætte dens værdi, uden at glemme etiske bekymringer.* • *mere info om datasikkerhed nødvendig!* • *Adgang til ms azurblå, amazon AWS* • *Eleverne skal være opmærksomme på vigtigheden af en god datastyring og de negative konsekvenser med hensyn til manglen på denne ledelse.* • *Etiske aspekter* • *Med konkrete eksempler* • *Jeg har. Jeg tænkte ikke over det.* • *Anvendelse af eksempler. Alle klasser jeg har taget ikke har mange praktiske eksempler.* • *At gøre det mere tværfaglig* • *Relationelle databaser og SQL* • *Det er ikke undervises i almindelighed, så der er bogstaveligt talt intet for at forbedre i øjeblikket.* • *Som jeg ser det gennem min erfaring, det største problem i ledelse undervisning data er den kortsynethed af studerende, er det svært nogle gange at få dem til at se hele billedet. Også, integration og god datastyring giver mulighed for en mere effektiv og problemfri arbejde, men*	• *Hvordan man kan sørge data gearede ordentligt, hvordan man kan opkvalificere og undervise iværksættere til at opkvalificere efter behov ligesom løbende forbedringer* • *Følg bedste praksis rundt om i verden, hvad der er den mest effektive måde at undervise vanskelige moduler, der passer modulet med læring teknikker nødt til iværksætteren* • *Lær digitale fodspor og reputation management og medborgerskab som en del af pensum ville være nyttigt at iværksættere* • *Hvad er de bedste og mest gavnlige emner, jeg kan undervise iværksættere i data management, hvad der er behov i forskellige områder, f.eks finansielle, menneskelige ressourcer, markedsføring osv* • *Være i stand til at formulere de rigtige data management kurser og indhold er egnede til iværksætteri* • *Jeg har brug for mere information og forståelse omkring sikkerhed og intelligente enheder, handel online og konsekvenserne, og hvordan til at håndtere denne* • *Jeg vil gerne være i stand til at levere bide store moduler til mine iværksættere, så de er ved at lære i deres eget tempo, hvis dette er deres præference, hvordan gør jeg dette, og hvilke emner kunne leveres på denne måde fx ved hjælp af forskellige enheder* • *Hvad er de vigtigste digitale og data management færdigheder, at iværksættere skal kende og forstå på de forskellige stadier af deres virksomhed* • *Håndtering af digital identitet bør medtages. At sikre, at vi er holdt ajour med periodiske læringsmoduler. Måske arbejder med andre undervisere og mentorer for iværksættere i datastyring* • *Hvordan kan bruges til indhold, er det fleksibelt og kan vi tilpasse den t passer iværksætteren behov. Hvad er den mest*

mange ikke engang prøve, fordi de ikke kan se eller forestille fordelene ved det. Det er især vigtigt i samarbejde arbejde som er videnskabelig forskning. • *Teori* • *UDDANNELSESSYSTEMET STATUS STUDERENDE* • *Software anvendelighed for læring eller undervisning formål* • *Lærernes kompetencer - uddannelse handlinger meget tiltrængt i dette område. Men det vil have en positiv effekt, hvis en anden tankegang er udviklet* • *Taylor gjort programmer til undervisere* • *Generel forståelse* • *Maskine læring / AI. Eleverne skal være i stand til at lære af data, ikke bare gemme dem ordentligt.* • *Interessante miljøer (data + værktøjer) til at spille med der mangler data* • *Det grundlæggende. Mange mennesker savner grundlæggende viden, men arbejde med data. Et eksempel er brugen af statistik-software uden at vide hvorfor, og hvordan du vælger de rigtige værktøjer.* • *Samlet ydelse og brug.* • *Marketing* • *Træning Trainer* • *datakvalitet* • *Dataanalyse* • *praktiske færdigheder* • *Viser hvad dataanalyse kan ikke gøre* • *At forstå, hvad dataanalyse fører til dvs betydningen af at anvende learnings fra, hvad du har lært af dataene. Brug den til løbende forbedringer. Klare eksempler eller arbejdsgrupper eksempler på god praksis.* • *integrere viden* • *Online hjælp* • *Jeg er bekendt med det i almindelighed, så noget at gøre med det* • *Lær gennem praksis frem for teori ..* • *mere uddannelse om vigtigheden af det* • *akademiske personale har brug for at forstå det først* • *Kurser & større generel viden* • *alle områder omkring datahåndtering* • *at få de studerende til at forstå vigtigheden*	*hensigtsmæssige indhold, som jeg skulle undervise* • *Vi har brug for yderligere forklaring på BNPR, medborgerskab, Sikkerhed, forskellige teknologier, der kan bruges, software sammenligninger, streaming, rapportering og semantik* • *Jeg ønsker at forstå analytiske data, data mining og hvordan du får vist dette, når jeg lærer det, så det er forståeligt* • *Hvad er de bedste måder at undervise forskellige emner og de teknologier til at bruge, ville min præference være at have noget, der kan bruges i og uden for undervisningslokalet* • *Opdater teknologi i klasseværelset, så den passer, det påvirker læring klasseværelset, er vi nødt til at bruge og lære forskellige teknologiske iværksættere vil bruge på arbejdspladsen* • *Opdater teknologi i undervisningslokale, der passer, det påvirker læring klasseværelset, er vi nødt til at bruge og lære forskellige teknologiske iværksættere vil bruge på arbejdspladsen* • *Jeg finder datavisualisering er meget nyttigt og vil gerne vide mere, og hvordan at indarbejde i mit pensum. Andre områder, jeg ville være interesseret i at vide mere om, er store data, lagring, bearbejdning og sletning af data* • *Beslutninger om identifikation, indsamling og forvaltning af data bør være baseret på pædagogiske principper. På denne måde pædagoger kan have større frihed til at skabe balance mellem faglig autonomi og agentur imod de krav, som ansvarlighed systemet.* • *Jeg vil gerne lære det på en meget enklere måde, ved hjælp af forskellige software og enheder, der gør det lettere at lære for iværksættere*

• *igen, perspektiv kræves om 'hvad er data'* • *bør være på tværs af alle kurser* • *Foretag personale se relevansen.* • *grad af bevidsthed øges* • *Mere forståelse om nødvendigheden af undervisning om data* • *Alt* • *begrænsningerne i data* • *Mere praktiske kurser* • *underviser viden* • *bedre forståelse omkring datakvalitet* • *Time tildeling.* • *Datasikkerhed* • *Jeg har brug for uddannelse i dette* • *Jeg ved ikke nok om det, og har ikke meget interesse i det* • *Gør det relevant for ens fagområde, snarere end en generaliseret tilgang* • *Venligst gøre denne tilgængelig som et værktøj i modsætning til at gøre os alle ind i data-forskere, skal det være en tilgængelig, værdiskabende kursus* • *Hvordan det gælder for mit undervisningsmiljø og hvad mine elever har brug for at vide, når ind i erhvervslivet karriere verden* • *Sådan uddanne undervisere og hvordan undervisere kan forbedre deres undervisningsmetoder* • *reducere unødvendige byrder for data management ved at sikre, at hver dataindsamlingen har et klart formål, og at processen er så effektiv som proces i undervisningen*	• *Jeg ved aldrig, hvad data emner at inkludere og som er den mest gavnlige, så tilpasse dem til iværksætteren behov* • *Jeg har brug for at inkludere flere data emner i mine kurser* • *Kravene til ansvarlighed systemet skal reduceres. Jeg har brug for at have en bedre forståelse af den aktuelle iværksætter verden* • *Forberedelse iværksættere med mere up to date data management teknikker og de færdigheder og viden, der kræves, er vi stadig forældet* • *Hvad er de mest gavnlige iværksætter emner, som jeg har brug for at undervise i datahåndtering* • *Juster vores træning system for at få iværksættere klar til det skiftende arbejdsmiljø, som har ændret sig meget i de seneste år. De har brug for den mest up to date færdigheder og teknikker, så de kan udføre bedst. Vores uddannelse pensum skal tilpasses.* • *Kravene til iværksættere har ændret sig, og de har brug for at forstå de tekniske behov bedre i øjeblik disse tekniske materialer er højere end hvad vi har i øjeblikket* • *Jeg forsøger at holde mine data management emner op til dato, men er ikke sikker på, hvis jeg bruger de bedste versioner. Under case studies og flere videoer ville være gavnligt for iværksætter-læring*

Bord 6: Forbedring af undervisning om data

STUDERENDE

De 276 spørgeskemaer udfyldt af studerende eller spirende iværksættere består af 74 spørgeskemaer stilles til rådighed af USA, 66 af VGTU, 45 af EUCEN, 87 af LYIT og 1 af EUEI og 3 ved FELTECH. 97% af de adspurgte var studerende, og 3% af spirende iværksættere, seDiagram 45.

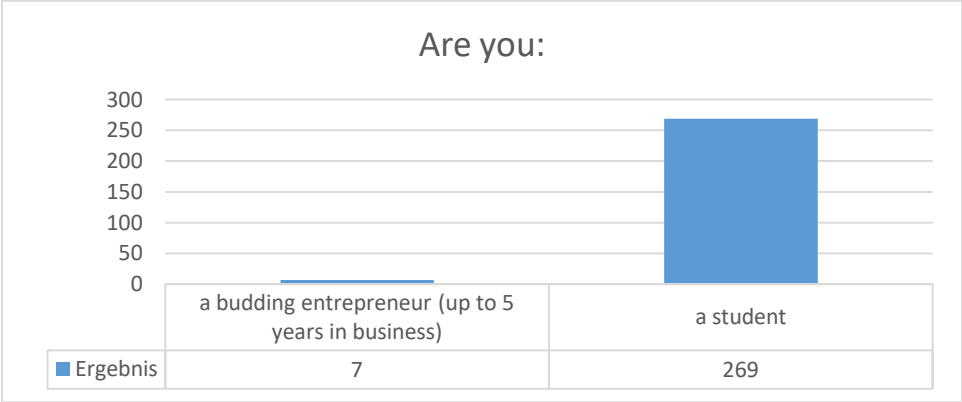


Diagram 45Forskning prøve - studerende eller spirende iværksættere

Respondenterne kom fra 19 forskellige lande, hvoraf den største gruppe var Polen, Irland og Litauen, se Diagram 46.

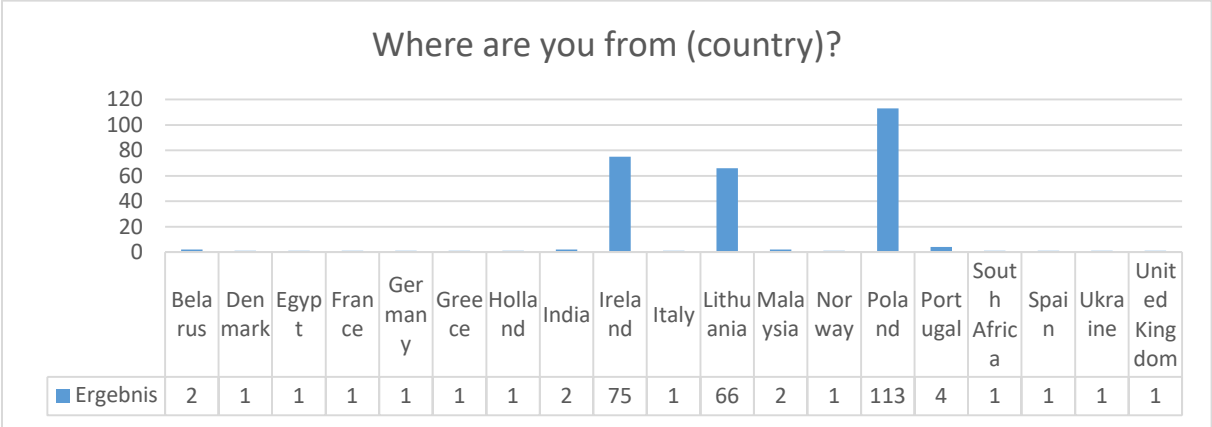


Diagram 46: Forskning sample-lande

Respondenterne blev spurgt om deres forhold til datahåndtering, der spørger, om de deltog i klasser relateret til dette emne, se Diagram 47.

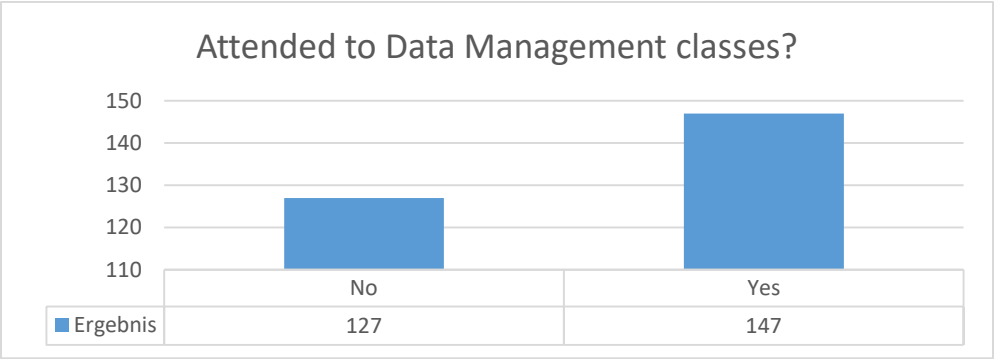


Diagram 47: Deltog til data management klasser

Blandt emner relateret til datahåndtering var elementer såsom, seBord 7:

• Digital forretning • Forretningsledelse • Avancerede Databaser • data Analytics • Digital virksomhed • Ledelse og lederskab • forretning organisation • Ledelse, organisation forandring • Forretningsservice Information Systems • Information Systems for erhvervslivet • digital virksomhed • datakvalitet • Sikker Software Development • Data for videnskab • ECDL • Kommunikation • Matematik 4- Statistik • Matematiske færdigheder for videnskab • Business Intelligence / Big data Arkitektur • Matematik • Forvaltning af det menneskelige hætte • datamodellering • Databaser • Data, struktur og beregning evne • DET	• data, videnskab • Databaser, • Forretningsledelse • Big data • Datasikkerhed ledelse • Programmering med R, Data Science Seminar, NLP • algoritmer og data • IT klasser • e-business • Datastyring • Forvaltning af data • Datastyring • Information Systems og • databasesystemer • Digital Forretning Information Systems • office administration • Dataanalyse, Projektledelse • ISI • Forvaltning af viden • office administration • Datasikkerhed • Statistikker • Analytics

Bord 7: Emner relateret til datahåndtering

Studerende besvaret spørgsmålet om, hvorvidt de er tilfredse med undervisning emner relateret til datahåndtering. 106 svarede ikke, 79 respondenter tror, at systemet er godt, men kunne have været gjort små ændringer, seDiagram 48.

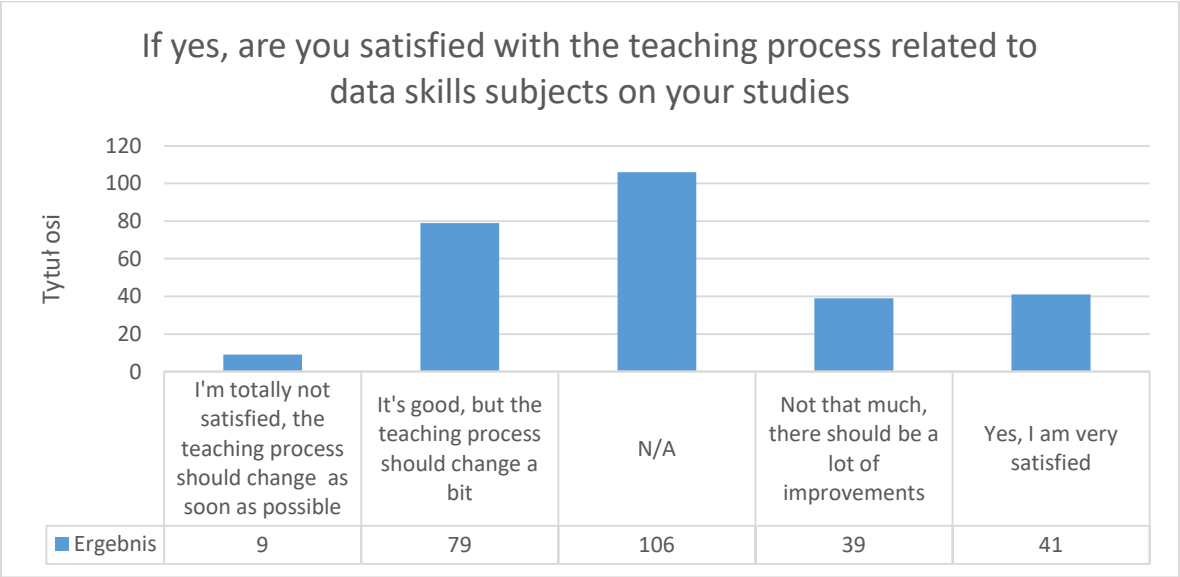


Diagram 48: Tilfredshed med undervisningen

Diagram 49præsenterer gennemsnittet af resultaterne af afsnittet Smart Data. Studerende i 30% angiver manglende færdigheder på dette område, og 30% angiver enorme mangel på færdigheder på dette område.

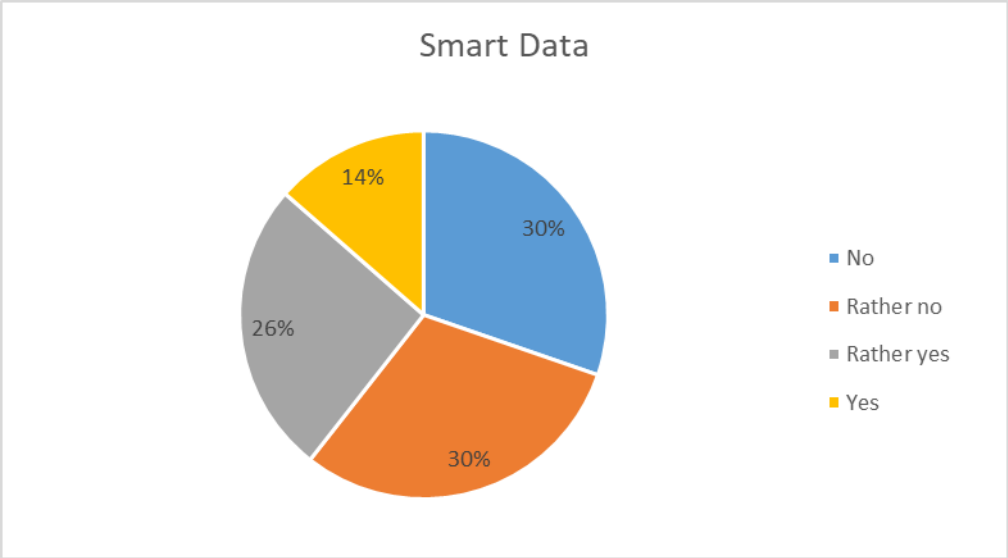


Diagram 49: Smart Data

Diagram 50præsenterer gennemsnittet af resultaterne af afsnittet Data governance. Studerende i 36% angiver manglende færdigheder på dette område, og 27% for mindre manglende færdigheder.

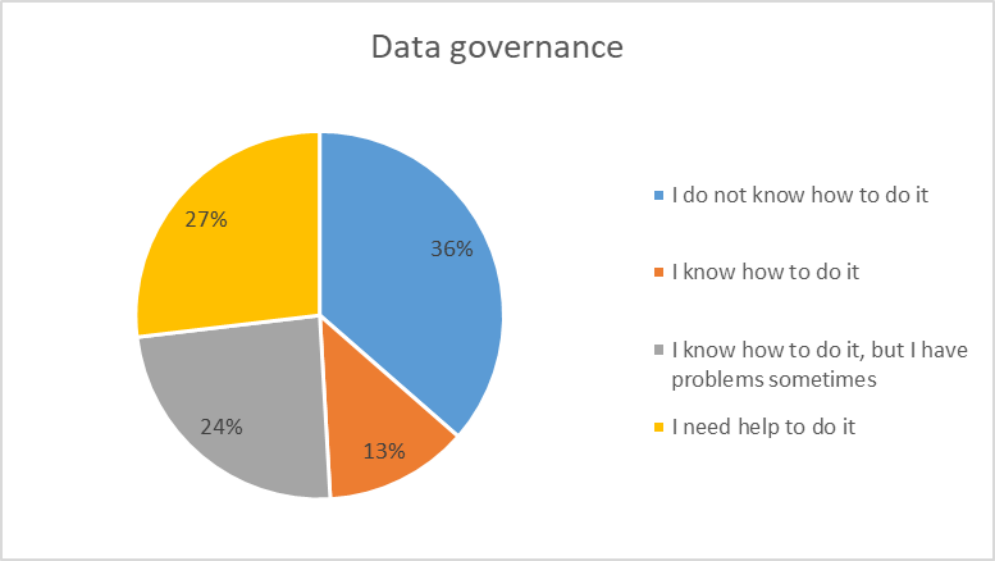


Diagram 50: Styring af data

Diagram 51præsenterer gennemsnittet af resultaterne af afsnittet Sikkerhed. Studerende i 29% angiver gode færdigheder på dette område, og 30% for mellemstore mangel på færdigheder.

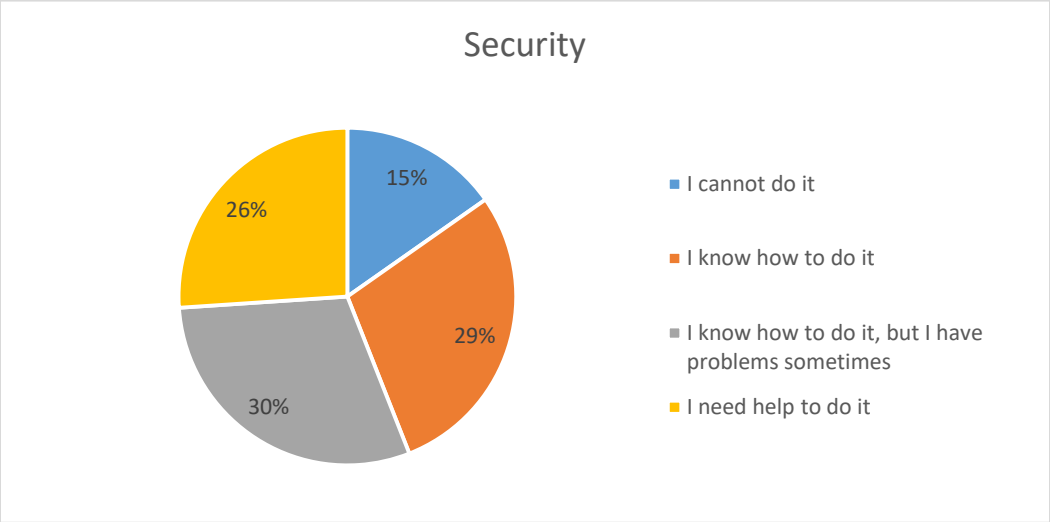


Diagram 51: Sikkerhed

Diagram 52præsenterer gennemsnittet af resultaterne af at søge efter oplysninger sektion. Studerende i 60% angiver gode færdigheder på dette område, og 20% for mellemstore mangel på færdigheder.

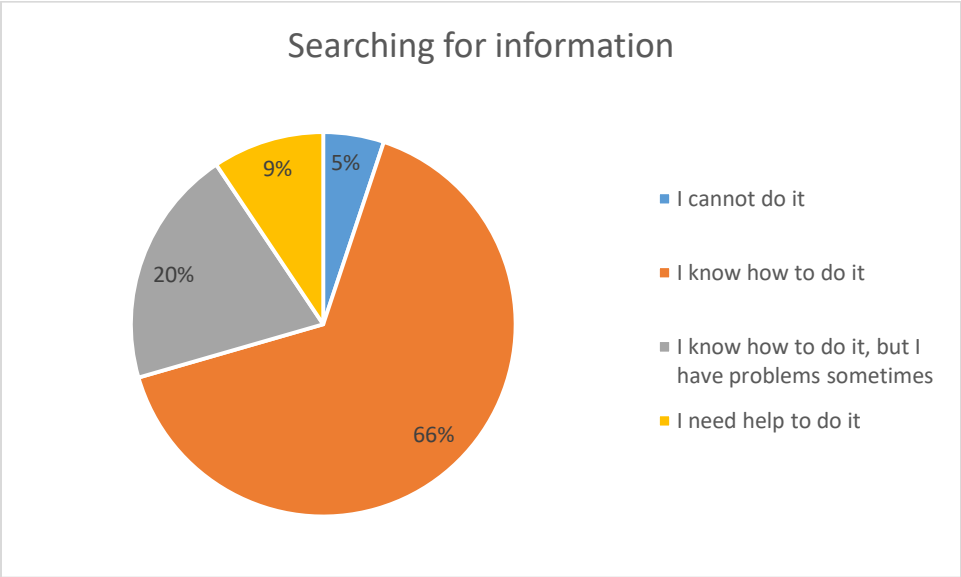


Diagram 52: Søgning efter oplysninger

Diagram 53præsenterer gennemsnittet af resultaterne af afsnittet Software Skills. Studerende i 49% angiver meget gode færdigheder på dette område, og 28% har gode færdigheder, men nogle gange problem at anvende den viden.

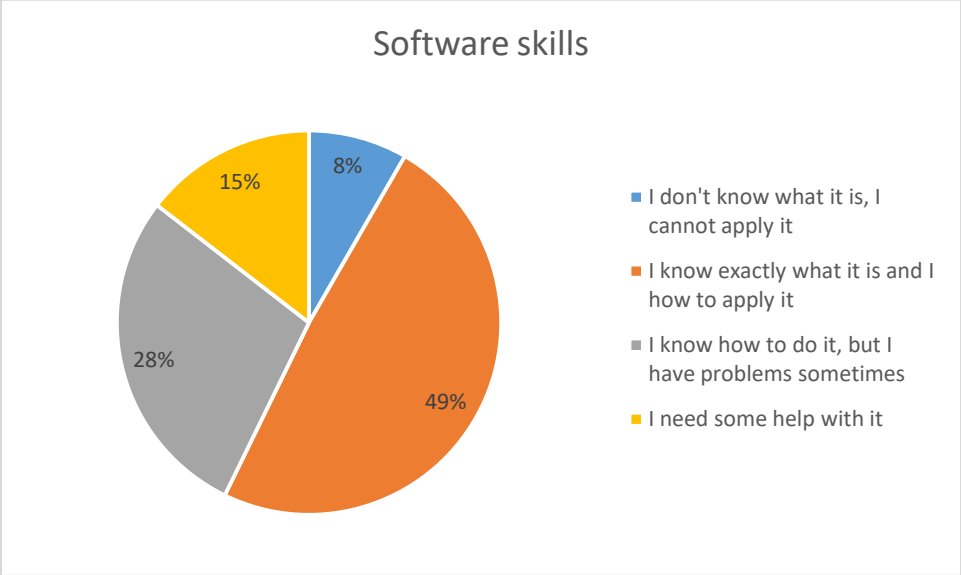


Diagram 53: Software færdigheder

Diagram 54præsenterer gennemsnittet af resultaterne af den online software usability sektion. Studerende i 55% angiver meget gode færdigheder på dette område, og 24% har gode færdigheder, men nogle gange problem at gøre det.

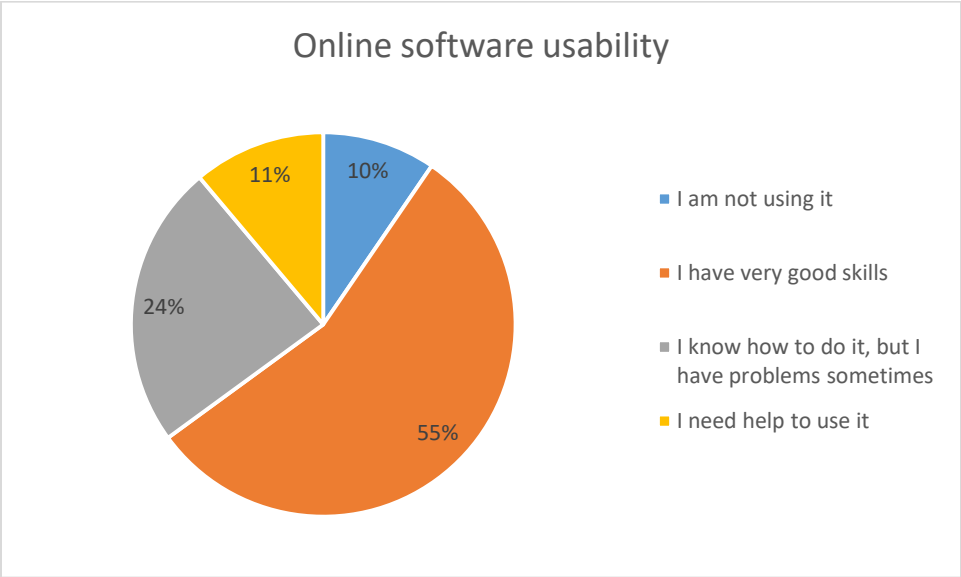


Diagram 54: Online software usability

Diagram 55præsenterer gennemsnittet af resultaterne af online software anvendelighed til læring eller undervisning formål sektion. Studerende i 23% angiver meget gode færdigheder på dette område, og 30% har gode færdigheder, men nogle gange problem at gøre det.

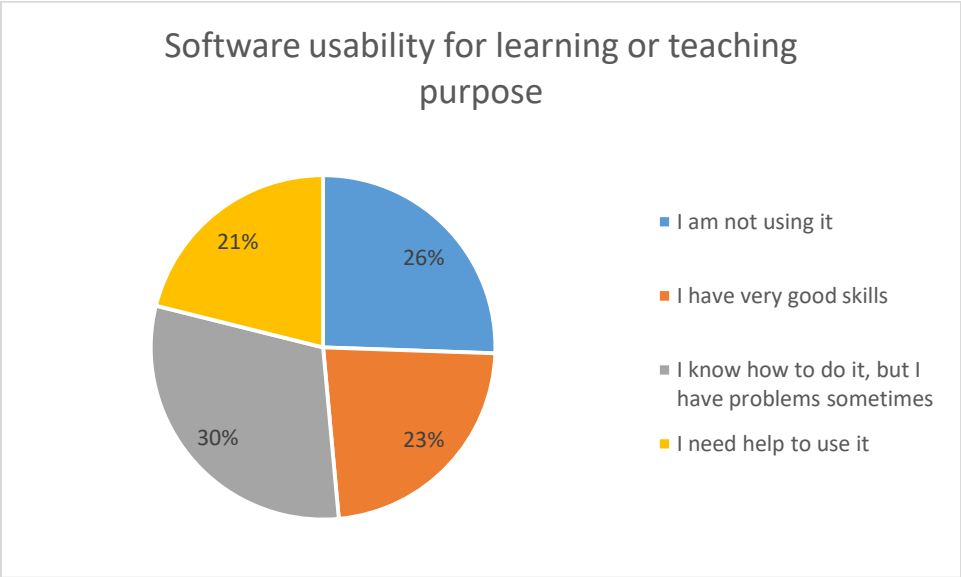


Diagram 55: Software anvendelighed for læring eller undervisning formål

Diagram 56præsenterer gennemsnittet af resultaterne af den tid med digitale enheder sektion. Studerende i 51% angiver anvendelse digitale enheder mindre end 1 time om dagen.

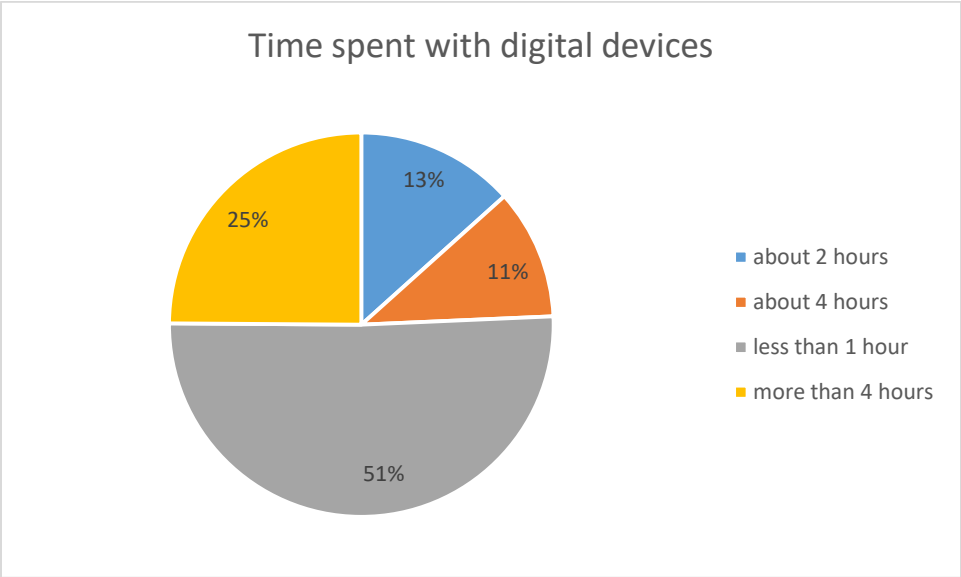


Diagram 56: Tid brugt med digitale enheder

Diagram 57præsenterer gennemsnittet af resultaterne af Uddannelse (tid brugt til læring) sektion. Studerende i 58% angiver at lære mindre end 1 time om dagen.

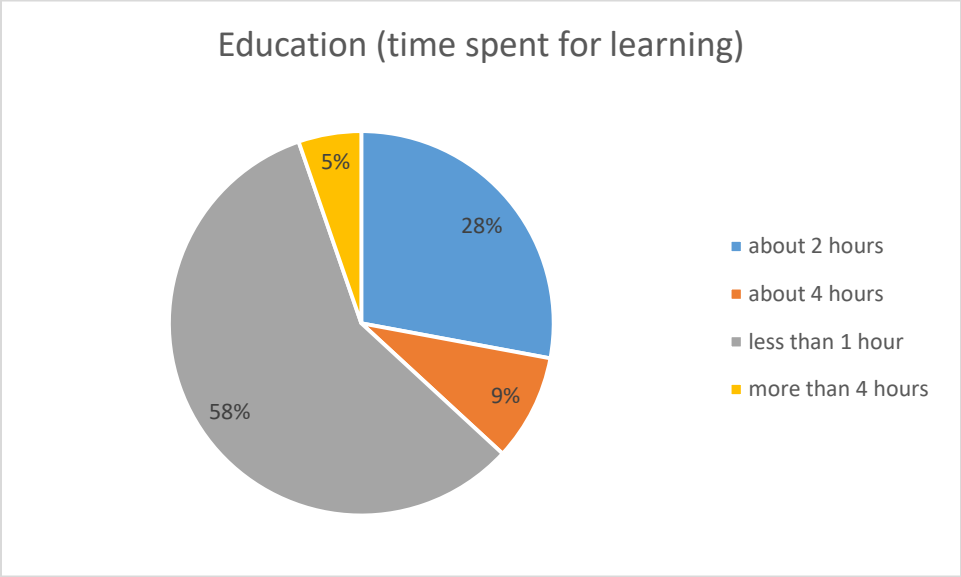


Diagram 57: Uddannelse (tid brugt til læring)

Diagram 58præsenterer gennemsnittet af resultaterne af uddannelse (deltager klasser forbedrer data færdigheder) sektion. Studerende i 45% er villige til at deltage i aktiviteter forbedrer deres data færdigheder, i 43% betragter det som en god idé, men de ville ikke gerne deltage i sådanne klasser.

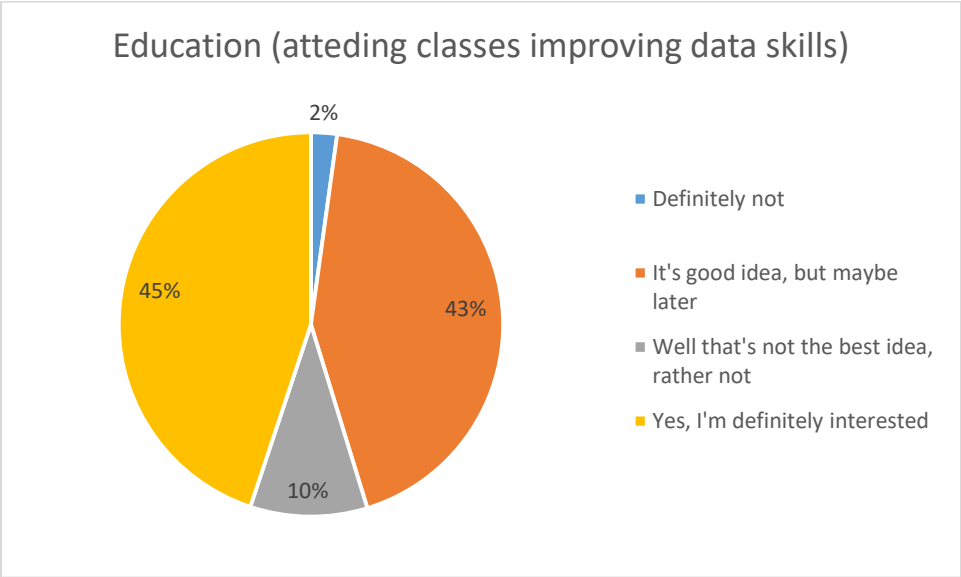


Diagram 58: Uddannelse (deltage klasser forbedre data færdigheder)

Diagram 59præsenterer gennemsnittet af resultaterne af uddannelse (anvender viden om data) sektion. Studerende i 43% erklærede, at de ville bruge den erhvervede viden til erhvervsmæssige formål og 33% i hver dag situationer.

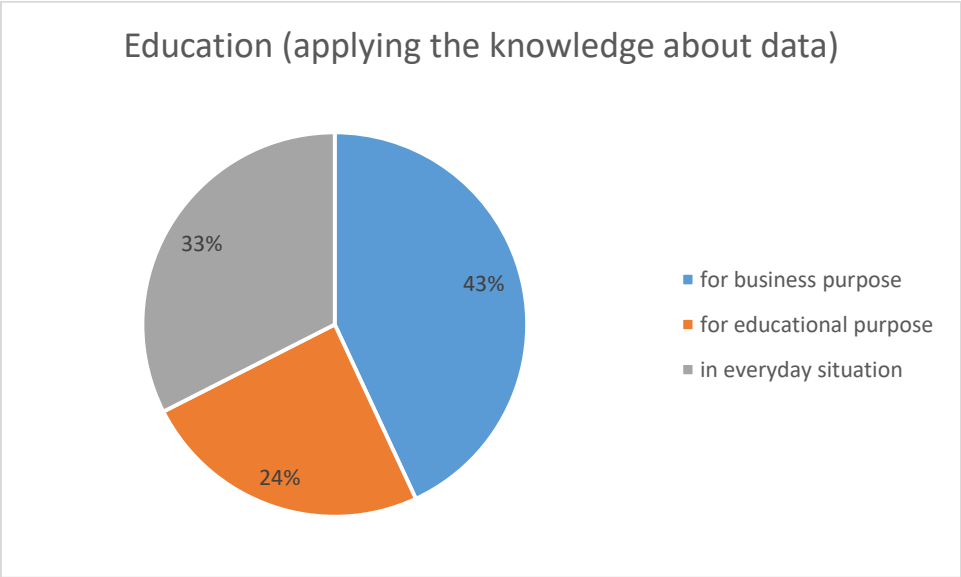


Diagram 59: Uddannelse (anvendelse af den viden om data)

Bord 8 præsenterer gennemsnittet af resultaterne af spørgsmålet hvilke emner relateret til datahåndtering er vigtige og / eller bør være omfattet af undervisningspligten? Anbringe betydning (1 - mindst betydende, 6 - mest betydningsfulde)

[Database & Storage Management]	[Data modellering og design]	[Datasikkerhed]	[Data Quality]	[Dokumenter og Content management]	[Data Integration og Interoperabilitet]
4,266667	4,094444	4,966667	4,566667	4,388889	4,044444

Bord 8: Betydningen af emner relateret til datastyring

Det vigtigste synes at være datasikkerhed, den mindst betydende emne i vores forskning er blevet data modellering og Design.

IV RESULTATER AF KVANTITATIV FORSKNING

469 mennesker deltog i forskning, hvoraf 193 var repræsenteret ved akademisk personale. Over 53% af de akademiske undervisere og forskere har mere end 10 års erhvervserfaring. På den anden side, i omfanget af vores forskning vi undersøgte 276 elever, hvoraf nogle af dem er også begyndt iværksættere. De dominerende nationaliteter for begge de adspurgte grupper var Polen, Irland og Litauen. Over 52% af det videnskabelige personale gør, har intet til fælles med datahåndtering og blev aldrig involveret i at holde klasser, der fik nogen forbindelse med forvaltning af data. På den anden side i elevgruppen - mere end 53% erklærer, at de deltog i kurser relateret til datahåndtering. Med hensyn til tilfredshed med universitetets aktiviteter i forbindelse med datafærdigheder delte meninger hersker,

Indsamling af en stor mængde data, og dermed udviklingen af store datasæt kaldet Big data, og deres evne til at blive behandlet i Smart Data er en høj værdi for dagens business scene. Smart Data er dataene, hvorfra du kan (tillade os at) træffe forretningsmæssige beslutninger. Behandling af oplysninger, så genererer udsagn, analyser eller rapporter, i sidste ende gør det muligt for effektiv beslutningstagning og vil være grundlaget for økonomisk vækst i de kommende år.

I afsnittet relateret til Smart Data, blev begge grupper af respondenter spurgt om deres viden relateret til begrebet Smart Data, typer af analyser og databaser, som er forbundet med dette koncept. Kun mere end halvdelen af det akademiske personale erklærer viden på dette område, mens 60% af de studerende erklærer en mangel på viden inden for Smart Data

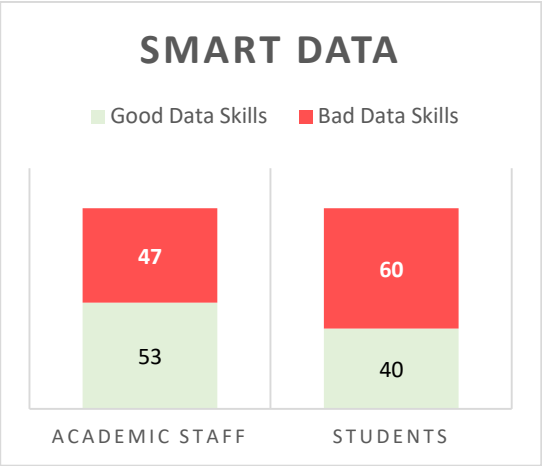


Diagram60: Smart Data - resultater

data regeringsførelseer en data management koncept, der gør det muligt at indføre styring i organisering af data. I lyset af den stadigt stigende masse af data, og på samme tid den stadig vigtigere rolle oplysninger i ledelsesprocesser, er det vigtigt at have en fornuftig og organiseret tilgang til, hvordan data administreres, behandles og beskyttes.

Sikkerhedproblemer bør ledsage enhver bruger af enheder, der tillader data at blive afbrudt. Derfor er de færdigheder inden for datasikkerhed, sikker brug af enheder forbindelse til internettet eller digital identitet beskyttelse er en af de vigtigste aspekter data færdigheder.

I afsnittet Sikkerhed, har respondenternes færdigheder i sikker brug og sikkerhed af deres data, samt løse problemer i forbindelse med datasikkerhed og software er blevet testet. Blandt videnskabelige medarbejdere, 49% af mennesker afsnittet Data styring kontrolleres respondenternes viden om ledelse og databehandling samt deres anvendelse i den daglige forretning. I dette tilfælde 57% af det videnskabelige personale og 63% af de studerende angiver mangel på tilstrækkelig viden på dette område.

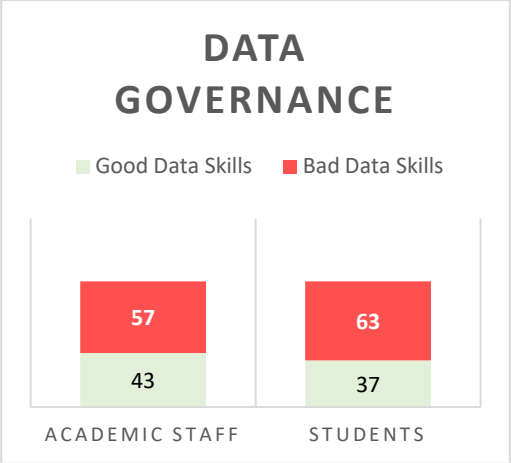


Diagram 61: Data Governance - resultater

erklærer problemer i forbindelse med dette, og kun 45% af de studerende

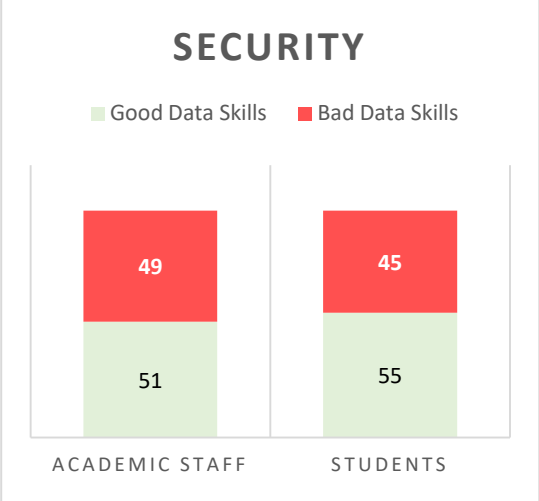


Diagram 62: Sikkerhed - resultater

Søgning efter oplysningerer i øjeblikket meget almindeligt og i løbet af dagen et væld af gentagne aktiviteter. Effektiv informationssøgning, dvs. færdigheder til at begrænse søgeresultater og hensigtsmæssig brug af den fulde søgemaskine kapacitet, sparer tid og finder god kvalitet data eller oplysninger.

In the field of Searching for Information, about 80% of respondents from the group of students (86%) as well as academic staff (83%) declare very good skills.

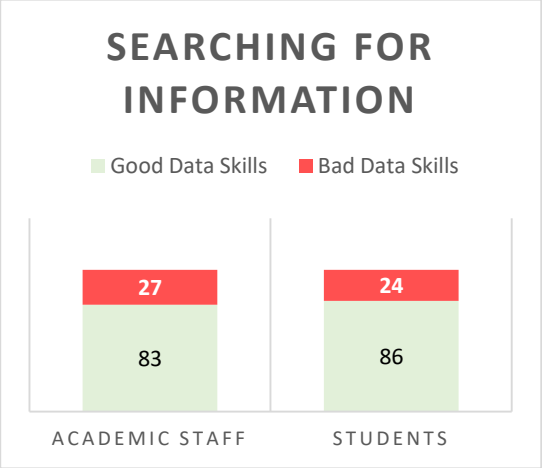
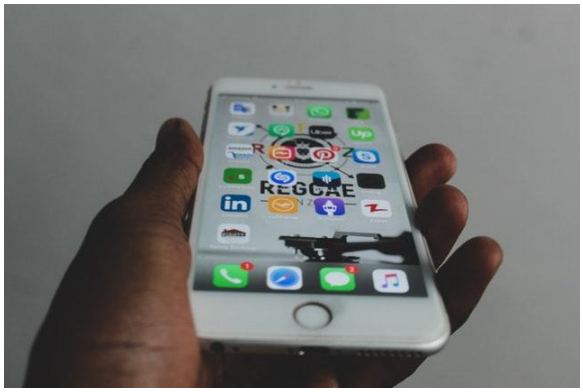


Chart 63: Searching for Information – results



Computers are an essential tool for the work, communication or even entertainment. Skills related to the selection and service of basic and specialized software are highly important and allow free and flexible movement nowadays, which primarily focus on the development of technology.

In the Software Skills section, related to the use of software and skills related to its selection, fitting and installation on devices of various types, students declared 77% good skills in this respect, and the academic staff only declared their skills in 59%

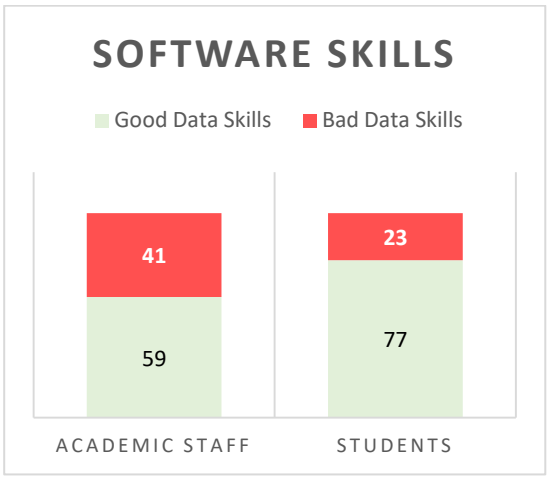


Chart 64: Software skills - results

When using online services, attention should firstly be paid to the security of data that may be at risk by hackers, stalking, viruses or spam. Social media, Online banking, or online instant messengers, are particularly vulnerable to data theft, due to lack of knowledge about the proper use of websites and protection of the computer against external attacks.

The Online Software Usability section examined whether respondents use online services and their ability to use online software that processes sensitive data, such as personal data, banking data or third party data. As for the skills related to Online Usability Software, 74% of students and 73% of academic staff declared good skills in this area.

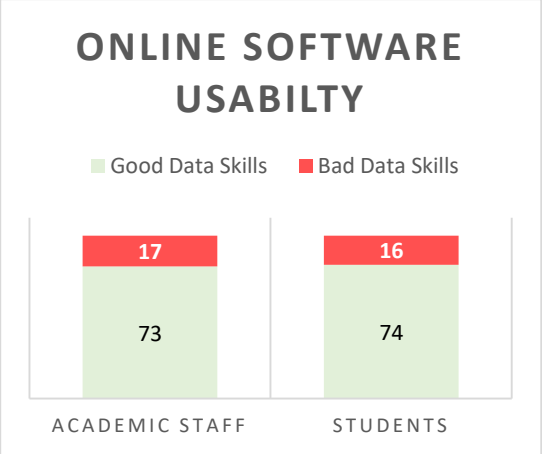


Chart 65: Online software usability - results

The Internet is a basic source of knowledge and a learning tool. The interactivity of science supports the learning processes and creates the opportunity to enhance the transfer of knowledge. Knowledge of various tools and services as well as ease of use gives the opportunity to broaden the sources of information, which translates into the development of individual competences.

Software usability for learning or teaching purpose refers to the use of various websites for scientific purposes as well as modern tools for the transmission of information and data generation. 53% of students declare good skills, 26% do not use such tools, 58% declare good skills in the case of academic staff and 21% do not use such tools.

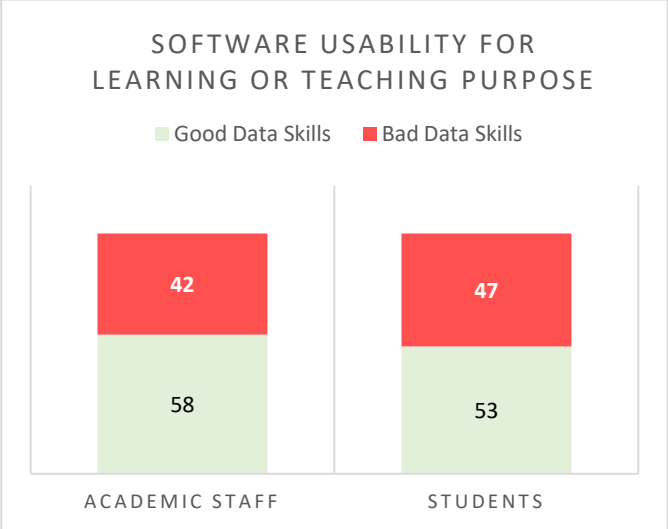
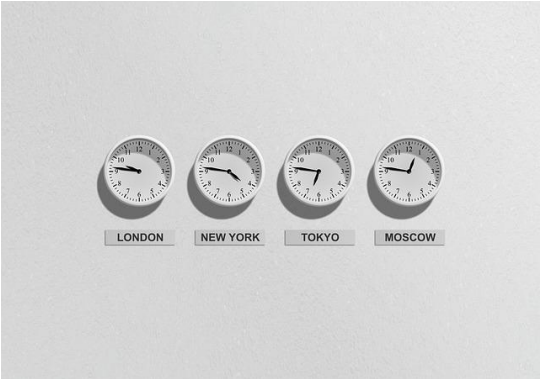


Chart 66: Software usability for learning or teaching purpose - results



The Time spent with digital devices section defines to us how many times respondents spend time using devices that process data. Overall, 64% of students and 67% of academic staff spend up to 2 hours on using such devices as a computer, tablet, smartphone, wearable devices or gaming devices. Of which 43% of students and 65% of academic staff declare that they spend over 4 hours a day on using a computer. A high percentage, in the case of the academic staff, confirms the fact that the computer is an instrument of their daily work. In the case of students, from the time that they devote to using digital devices, 58% of them spend less than one hour per day for educational purposes.

In the Teaching section, the academic staff was questioned about their skills related to curriculum development and university policy, improving digital competences and contributing to the spread of entrepreneurship among students. 58% of respondents believe that they have problems with shaping the relevant curricula.

On the other hand, students were asked about their interest in subjects that would improve their data skills. 43% of students declare to use these skills for business purposes, 24% for educational purposes, and 33% in everyday situations.

Considering the high demand and interest among students related to the development of data skills competencies, the Academic staff should improve their skills in this area in order to be able to respond to the requirements of today's teaching market.

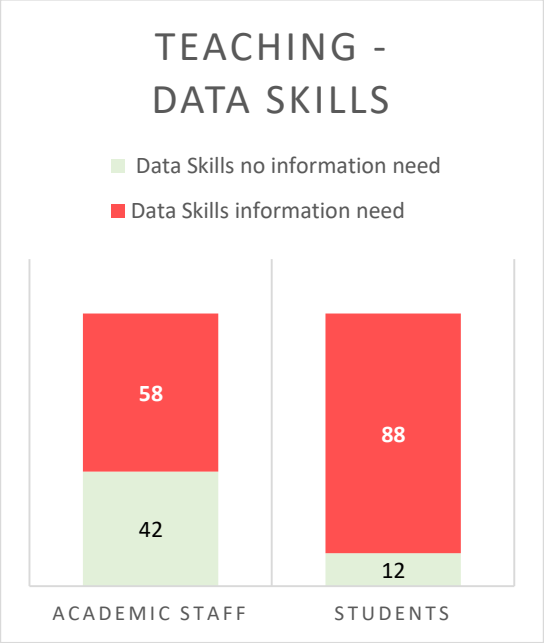


Chart 67: Teaching - results

Academic staff was also asked to indicate the main problems in the current system of teaching related to data skills.

The most important factors indicated are the lack of appropriate shaves (82%) and the lack of specialist knowledge (82.9%), which should be passed on by experts. The smallest problems include the right attitude to the high importance of data skills (54.4%).

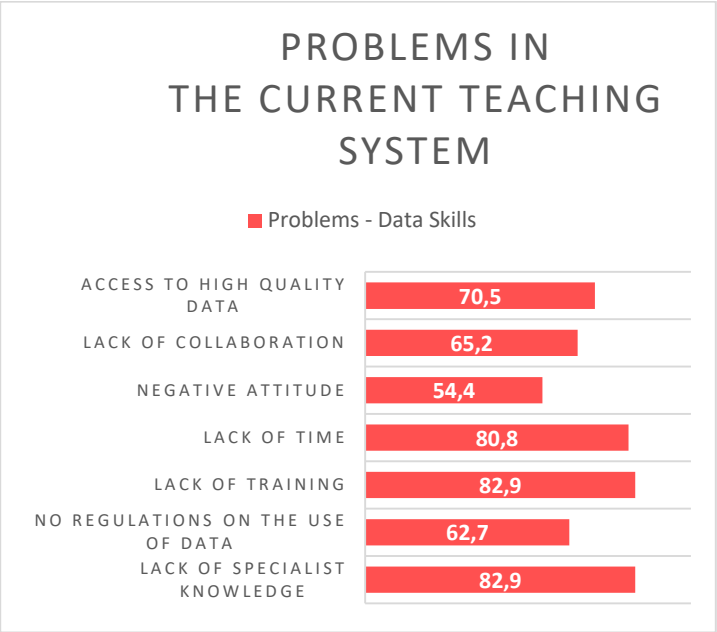


Chart 68: Problems in the current teaching system

In the next section, the academic staff was asked to propose solutions that would improve the teaching system related to data skills. Among others it was proposed to introduce more practice, case studies based on real data and cases that support entrepreneurship in students, creating training, inviting experts, introducing clear vocabulary, adding new teaching modules that take into account effective data management, including data security, data quality and data analysis, introduction of gamification, automation and machine learning.

V RESULTS OF THE DESCRIPTIVE QUESTIONNAIRE - QUALITATIVE RESEARCH

In the next study, using questionnaires containing 7 descriptive questions, the project partners were asked about their opinions on their experience with data skills. The following qualitative study has enabled a deeper analysis of the studied phenomenon as well as obtaining individual views of the studied units. The questionnaire allowed to present a broader view of the problem being examined and to obtain personal recommendations that would enable the achievement of project objectives.

The questionnaire contained the following seven questions:

1. *Do you find the data management important? If so, why?*
2. *How would you assess the usage of data management by entrepreneurs in your region / country?*
3. *Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?*
4. *Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country? If yes, please name them and provide us with a link to website.*
5. *Would you recommend any good practices related to data management courses from your country or from abroad?*
6. *What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?*
7. *In your opinion, what are the most important areas of your life in which you can use data skills?*

The full results of the analysis have been attached in

Appendices; see**Błąd! Nie można odnaleźć źródła odwołania.** to Appendix 5.

On question 1: "Do you find the data management important? If so, why?" all experts answered YES, justifying their answer with the following arguments:

Data management (…):

- is relevant due to the technological developments and digital advancement,
- in terms of Big Data and Analytics as they are drivers of change,
- is crucial that proper data is used in learning,
- is relevant in context of SMEs as they are of huge importance in industry
- for business purposes, how we store, utilize and analyze data is a vitally important process,
- is important for managing data efficiently and useful in decision making and learning process, for businesses as well as for individuals
- in terms of "big data and smart data" proper management of data can drive productivity, innovation and growth,
- in context of data access over time is a useful way to track progress,
- helps to work more efficient and save the time and helps to improve productivity of data users
- is important when sharing the information between team members. Data stored in a database can be accessed also remotely,
- improves safety, data stored in a database can be better protected (it can be protected with a password or opened only using authorization protocols),
- in terms of data management systems have integrated backup and recovery functions, which protects losing data after crashing or system failure.

In question 2: "How would you assess the use of data management by entrepreneurs in your region / country?" experts pointed out the following problems related to usage of data management:

Data management (…):

- helps to choose the right information in terms of scope and of veracity is crucial for learning in face of an infinite set of data,
- is empowering individuals to handle data is also a responsibility for institutions that are in charge of the common good from universities to governments
- as the awareness grows about the legalities surrounding data management entrepreneurs and companies are becoming more aware of the way in which they store and use their clients' data
- usage of clients' info can be used to optimize and business outputs,
- is creating the greatest opportunities for businesses in terms of data analytics as the emerging technology from business leaders point of view
- in terms of inability to exploit digital analytics is a threat to growth
- gives substantial benefits in terms of jobs and growth from the global expansion of the "Big Data" sector

- is connected with the upsurge in big data, which has been driven by escalating volumes of detailed information originating from business, public sector, mass media, multimedia, social networking platforms and the 'Internet of Things',
- usage is not maximized. Poor knowledge of the potential of data that currently exists within their own organization, because of time constraints and staff limitations
- usage depends on the company size and type: companies, working exceptionally with data understand the importance of the data management and its advantages. Startups, smaller companies or companies not working with data as their main activity understand the benefits of data management and use of data management systems less: they do not have enough information on data management (to less information in educational institutions), do not want to invest time and money into data management. This leads to less efficient work and information sharing, less security and communication within the team.

To the third question: "Do you think that students / early stage entrepreneurs are enough to meet the needs of data management?" the partners replied as follows:

1. Most graduates and young entrepreneurs are not prepared for the importance of data management in a proper way. It is necessary to prepare everyone, not just graduates or young entrepreneurs, to handle data in a world where there is access to infinite data without proper guidance.
2. Most educational programs at all levels from kindergarten to continuing education have no learning outcomes addressing data management.
3. People who are growing up in this digital age and have advanced skills in this area and they can build on these skills through education and further education
4. According experience of working with hundreds of start-up entrepreneurs including students, graduates and early stage entrepreneurs, that their knowledge of and prowess in data management is weak. They may have some basic skills but typically fail to use data to analyze all aspects of a business management and operations to make appropriate business decisions
5. No, focus in the latter college years is on data collection and analysis for academic dissertations and no business purposes.
6. In the other study programmes not related to IT students only get the basics on data management but this topic is not directly involved in the study programmes. This means that if the person after completing a university wants to run a start-up, he needs additional skills and education on data management.

To the fourth question: "Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country?" the partners replied as follows:

- In several countries the application of the GDPR as provided in the European Directive. At national level there are national laws and regulation on privacy protection. There is no recommendation at national, regional or sectoral areas in terms of data management. In fact, the protection of data is envisaged but there are no official recommendations about proper use of data in general. That is fundamental for a democratic society where data use may become a ubiquitous asset like money or air.
- There are some existing study programs on the University connected with data management

- National policy advisory board for enterprise, trade, science, technology and innovation in the paper "Assessing the Demand for Big Data and Analytics Skills, 2013-2020" put forward a number of proposals relating to learning and education. These include that
    - Computer skills should be introduced at an earlier stage in the education system
    - There should be more focus on the teaching of maths at primary level.
    - A problem-solving approach should be adopted in second level maths curricula.
    - Greater female participation in analytics should be targeted from an early age.
    - At third level, cooperation between industry and academia is crucial to ensure that education reflects skills needs.
- In higher education, many modules would contain elements of data management, such as Google Analytics, Digital Marketing, and Statistics. But no official country wide to our knowledge.
- There are no national recommendations, but as an EU Member state Lithuania has to follow EU GDPR. The Ministry of Education and Science performed a research for further recommendations.

To the fifth question: "Would you recommend any good practices related to data management courses from your country or from abroad?" the partners replied as follows:

- The recommendation of any of these depends as in all degrees and courses on quality evaluation in education and training. Choices for this type of courses depend as any other educational area on many contextual indicators.
- It is vital that Data management process and practices are taught form a young age, eg. Implemented into high school curriculum in order to stay in line with market desire and promoting employability of learners.
- A Diploma in Data Analytics for Business (Springboard+). The Diploma in Data Analytics for Business aims to provide learners with a progression pathway to professional roles at entry or junior level in Data Analysis as well as the option to further their education in the area of Data Analytics. Admission to this Diploma is through one of the following:
    - Evidence of prior learning, including experiential learning, or
    - Possession of an NFQ level 5 award, including leaving certificate, FET award, or equivalent.
- The Springboard+ upskilling initiative in higher education offers free courses at certificate, degree and masters level leading to qualifications in areas where there are employment opportunities in the economy.
- The Canadian University of Waterloo model see students equipped with 24 months of experience upon graduation.
- Courses (and careers) in Big Data Management in Ireland https://www.goireland.in/big-data-management-course-ireland.
- Tech connective live and conferences.
- Follow EU practice (GDPR).

To the sixth question: "What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?" the partners replied as follows:

- Data management should make part of every HEI or VET program in all levels of lifelong learning

- All programs should train everyone with strong analytical skills, capable of collecting, organizing and analyzing the information, translating it into a strategic resource that allows anyone to innovate, to develop competitive advantages and to act as a responsible citizen.
- More hands on and practical implementation of data management education should be adapted, starting school education. Encouraging learners who show an affinity with this topic to continue studying this topic, highlighting the opportunities which will be open to them.
- It is important that learners are shown the practical implications of successful and unsuccessful data management and, by using best practice examples, show the benefits.
- The key to improving data management education is to feature analytical modules across less technical disciplines, such as business and social sciences.
- Allow transition into analytics from other disciplines and up-skilling and retraining into the area should be encouraged. Short courses for individuals with technical backgrounds should be provided.
- Accredited and focused short courses that can be taken as CPD options. These could collate to an overall award. More attractive short/flexible accreditation that is industry recognized.
- Applied projects linked to SME needs
- Add more topics on data management: managers, engineers, artists – everyone has to gain this knowledge.
- Encouraging startups in the university. Each entrepreneur needs the understanding on:
    - data governance and data quality management
    - database management systems
    - data analytics/data mining
    - enterprise content management
    - big data management, etc.

To the seventh question: "In your opinion, what are the most important areas of your life in which you can use data skills?" the partners replied as follows:

- Political: understand what fake news is or choose reliable sources is fundamental in a world where manipulation has become easier.
- Professional: choosing the right data that will improve the procedures used to perform better in the roles assumed as a citizen.
- Personal: find proper data about restaurants to attend, the best route to take home when returning from work, the best flights to travel and the most profitable investment are small examples where data management can highly influence choices and decision making.
- Data management is a task present at any time of the day and of the night and the competences are fundamental to take solidly grounded and conscious decisions.
- Data skills are required for day job
- Data skills make life to easier eg. Google, Excel, Alexa, etc
- Online Shopping. Since the growth of Big Data in retail, the entire industry is completely changing.
- Wearables and health (e.g. my Fitbit and the powerful data in collates for weekly).
- Energy Consumption
- Using data skills to effectively conduct research, communications and message creation
- Interesting article Big Data is Everywhere
- In teaching relevant smart data skills to students and application to micro and small businesses

- From a student perspective, finding relevant, quality research. Business perspective, marketing and customer demand data.
- Ethical use of data needs to be addresses as well as how to be wary of how our own data is collected.
- How to use and link data, the context of key data sets and performance and SMART real/time data - how to manage this from a small business perspective.
- Tracking progression in life and work
- Personal data protection (e.g. product design)
- Customer databases
- Better CRM
- Information distribution between employees and teams
- Company data security
- To make company services more efficient
- To help employees work faster/more efficient
- To improve communication inside the company

VI POLITICAL AND REGULATORY CONTEXT

GDPR

The European Union regulates provisions related to the subject of data management. Above all, however, he focuses on the topic of data security. The "EU Charter of Fundamental Rights" provides that EU citizens have the right to protect their personal data.

The most important legislative package that emerged from the European Union in May 2016 and has been in force since May 2018 is the General Data Protection Regulation, whose main purpose is to prepare the citizens of Europe for the digital era. The regulations are valid throughout Europe, regardless of the place where data is processed. The Regulation makes it easier to conduct business operations by simplifying the rules related to the processing of digital content. The purpose of this regulation is to strive to ensure that every citizen will have the right to decide on their own personal data and decide who and where to store the data.

Special bodies have been set up in the European Union countries to oversee compliance with personal data protection laws in each country. The supervisory authorities of EU countries are now working together as part of the Article 29 Working Party. The European Data Protection Supervisor (EDPS) and the European Commission are also members of this group. On May 25, 2018, the Art. 29 Working Group will be replaced by the European Data Protection Board.

The Regulation on the protection of personal data sets out the requirements for the collection of personal data and the activities related to the management of personal data, it applies to all companies that collect and use data on individuals. The regulation is technologically neutral, it does not point to specific, specific tools and systems that are supposed to secure data. Therefore, it allows companies to design their own data protection systems, which means that the implementation of new regulations will require a certain dose of creativity. Because the regulations do not indicate a way to solve the problem, it means that companies must be guided by their own interpretation and adapt the system to the character of their company. Therefore, data protection does not only end with designing the system, but also matching the company's procedures and processes to the requirements of personal data protection.

From the point of view of the consumer, it is possible to request access to personal information that is stored by the given company, but also the possibility to delete them. A consumer agreeing to the storage of personal data must be informed about the purpose of their storage. Personal data includes the following information: name and surname, address, identity card / passport number, income, cultural characteristics, data in the possession of a hospital or doctor (clearly identifying a given person for medical purposes), but also IP addresses and cookies.

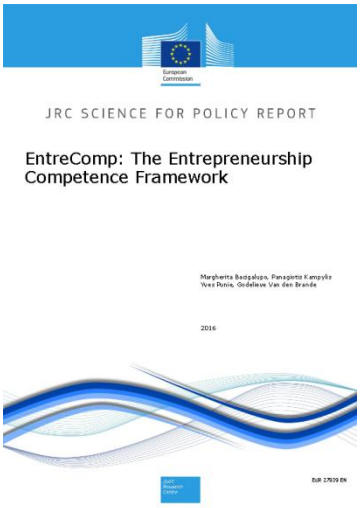
When implementing the provisions of the GDPR, it is recommended that the following steps be taken:

1. Inventory of processed data (where, for what purpose and which data are processed)
2. Risk analysis (who has access to data, which can cause data leakage)
3. Risk weight (determine the degree and the risk weight and the probability with which it may occur)
4. Solution (reducing the occurrence of risk, determining the security according to RODO)

ENTRECOMP

Entrepreneurship competence framework was published in 2016 by the European Commission. Over 18 months, many experts from all over Europe worked on the competence frames, which made it possible to take into account the situation prevailing in various Member States.

The main goal of EntreComp is to show the importance of the development of entrepreneurial skills of European Union citizens and to indicate the policy directions of the Member States allowing achieving this goal. The EnterComp framework presented defines entrepreneurship as a competence that enables the creation of a link between the side of education and professional practice. Entrepreneurship as a transversal competence finds application in a wide spectrum of issues such as employment, education, training and in relation to human life. This framework can be used, among others, to develop teaching programs that lead to the development of entrepreneurship among young people, treating it as a kind of competence and also allow for assessing entrepreneurial skills.


JRC SCIENCE FOR POLICY REPORT

EntreComp: The Entrepreneurship Competence Framework

2016

DIGCOMP

Digital Competence Framework version 2.0 was published by the European Commission in 2016. It was developed by a scientific group from European Union countries and a group of interests in industry, education and employment. In response to the message. "A new agenda of skills for Europe: Cooperation to strengthen human capital, employment and competitiveness", presenting ways of dealing with the subject of competences, aimed at

defining the range of skills that every European citizen should have in order to function in today's fast-growing economy, defined DigiComp framework, which in key skills such as reading, writing, counting, knowledge of science, knowledge of foreign languages, digital competences, entrepreneurship, critical thinking, problem solving and learning, provide tools to improve competences digital, designed to contribute to innovative society and the economy.

DigiComp allows for the formulation of a policy that enables building digital competences, defining a unified technical language of digital areas, defining a reference point on a European scale. The key digital competences include: information processing, communication, creating digital information, including programming skills and knowledge of copyright issues, maintaining safety, and solving problems.

DIGCOMPORG

The European Framework for Digitally Competent Educational Organizations is an extension of the DigComp framework for digital competence training by supporting educational institutions and educational systems in the digital transformation process. The framework allows for the creation of an effective policy that allows the practical use of technology in the education field.

In 2018, the European Commission also published the Digital Education Action Plan, which supports institutions in digital education, recognizing that IT skills development is an important factor. As part of its priorities, this plan provides for investment in IT competences. The plan's most important priorities include: Effective use of digital technologies in teaching and learning, Development of appropriate competences for digital transformation, and: Improvement of education systems through better data analysis and long-term planning.

EDUCATIONAL FRAMEWORK

At universities of our project partner countries there are guidelines for fields of study, primarily related to economics and IT, which define the scope of digital competences, including data skills.

The most important guidelines include:

- ability to understand the fundamental of data analytics and to visualize the data (include extracting, summarizing, filtering, joining, assigning data and create appropriate chart elements, using graphs, coordinates, as well as implementing principles of visualization designs to identify patterns and insight in data),
- ability to make sense of and to communicate with data to relevant audience
- knowledge about popular data analytics tools (i.e., Caseware IDEA, Microsoft Azure Machine Learning, Tableau Prep and Tableau Desktop),

• knowledge about digital media technology area (including problems with continuous change by technologies),

• development of analytical skills on empirical data by introducing popular data science methods to support decision making and evaluation in business (with focus on Business intelligence technologies, applications and practices for the collection, integration, analysis, and presentation of business data in order to support business decision making),

• knowledge about artificial intelligence and machine learning (with focus on analysis of data to perform predictions using statistical tools and methods, providing learning capabilities for machines; hence machine- and deep learning),

• development of computer skills at an earlier stage in the education system,

• development of cooperation between industry and academia (education reflects labor skills needs),

• development of data skills (wit focus on Google Analytics, Digital Marketing, Cloud Computing, Databases, Database Management, Database Administration, Information Security, Data Mining, Statistics, Data Analysis).

The guidelines related to staff training include:

• development of training strategies (changing the training model, including actions motivating academic teachers to draw on digital resources and focusing on activating teaching methods),

• introducing examinations to check the possession of digital competences (introduction of the Integrated Qualification System allowing the assessment of digital competences, recognized as market qualifications),

• elimination of digital illiteracy for teachers (especially people over 50).

VII RECOMMENDATIONS AND BEST PRACTICES

Among the results, it can be noticed that, on average, about half of the respondents have a lack of adequate knowledge and skills related to data skills. Compared to the students, the respondents of the academic staff show a greater theoretical knowledge in the field of data management, showing at the same time deficiencies in its practical application. While examining the students, this issue looks in an opposite way. In questions about knowledge in the field of theory and procedures, students show less knowledge, while in applications, they declare higher skills. What also results from the greater "online mobility" of current students and the partial access to the computer of this generation.

Academic staff and students were in favor of the great need to improve data skills from theoretical as well as practical sites. Academic staff notices growing deficiencies in current curricula, believes that they are not adapted to the present times, which exposes rapid technological development, and thus a large amount of information processed. In order to solve these problems, trainings conducted by specialized persons are needed, which will allow the academic staff to pass the required knowledge, which they will then be able to pass to the hundred and future entrepreneurs.

After analyzing both quantitative and qualitative surveys, it can be concluded that most students and academic staff have deficiencies related to data management and there is a growing demand for data skills. Due to the lack of regulations at the national level regarding other areas of data management (apart from the RODO, which is defined in the European Directive), there is a need to define good practices and recommends related to the acquisition of appropriate data skills for institutions educating future entrepreneurs.

RECOMMENDATIONS

1. Developing a strategic framework for the development of e-competences, including the preparation of a data skills development plan. The framework should contain separate strategies for the integration of digitally excluded people and e-activation of people using the Internet, as well as a catalog of digital competences, typologies of the benefits of using it, performance standards, and communication and information strategies for digital competences.
2. Implementation of the model through the introduction of a relational approach to the issue of developing data skills as the basis for all implemented activities. This means, firstly, that the model is popularized through information campaigns, training and educational materials. Promoting the importance of the concept of smart data management and data skills among academic staff and

students. Secondly, it is necessary to develop an operationalized model of relatively treated competences - aimed at achieving functional benefits in various areas of life - for the needs of implemented projects to improve e-competences.

3. Introducing the obligation to analyze the needs of training participants, including gathering information about their previous experience in the use of ICT, as well as about their needs, interests and motivations.
4. Ensuring better coordination of activities between entrepreneurs and universities in order to implement projects for the development of competences leading to the development of entrepreneurship of program participants. This will allow:
   - exchange of experiences,
   - development of standards (among others, the scope of training, the catalog of competences or evaluation and monitoring of activities) and to support self-regulation of entities implementing activities for digital competences,
   - ensuring the complementarity and coordination of activities carried out by various entities and from various sources of financing,
   - support of development of innovative methods for raising digital competences,
   - external monitoring and evaluation of activities,
   - collecting and sharing resources (including educational resources) created as part of ongoing projects,
   - conducting information, education and dissemination activities.
5. Creating tools measuring the demand for data skills of academic staff and students (due to different levels of experience and knowledge), on the basis of which you will be able to introduce training in data management, tools (specific software tools), methods tailored to individual needs, based on remuneration systems such as certificates, gamification.
6. Introduction of training for academic staff in the field of curriculum design, including data skills related topics.
7. Greater participation of entrepreneurs in shaping the curricula
8. Introduction for students (not only IT courses), subjects related to entrepreneurship and data management, based on practical examples (case studies) and salary systems such as ECTS points, certifications, and gamification. It is not recommended to enter too much theory
9. Introducing flexibility in the choice of modules, tailored to the needs of students, including primarily the subject of increasing Data Skills, such as:
   a. Smart Data
   b. Data Governance
   c. Data Security
   d. Software Technology
10. Creation of an effective long-term implementation plan taking into account technological and regulatory changes in the subject of data management

Over the last decade, good practices related to the development of digital competences, including data skills, aimed at developing entrepreneurship, aiming at e / integration and combating digital exclusion have included,

among others, three components: hardware, resource and competence. They provided adequate equipment, internet access, services and products needed to use the internet and training, increasing skills and knowledge.

Early good e-integration practices included equipping educational institutions with computer labs and creating nationwide networks of public Internet access points to improve professional qualifications, called distance learning centers.

BEST PRACTICES

• Training

Training is a good practice focused on developing competences. One of the moving examples may be the e-learning course, e.g. the Polish "N @ utobus", operating in the field of education: the Ministry of National Education has trained nearly 17,000 teachers in the project "ICT teacher training courses". Another example can be the project "SIRMA - Network for Innovative Mazovia e-Development", implemented in the Mazowieckie Voivodeship by the City Association on the Internet. The aim of the project was to increase the potential of innovative activities using ICT through specialized training for representatives of public administration.

• Digital incubators

Creation of digital incubators providing substantive support in the development of digital competences. An example is the project project e-Centers, implemented by the Foundation for Helping Mathematics and Movable Physicists using public Internet access points created under the program "Distance learning centers in the villages".

The main tasks of digital centers would be:

- for identification of partners
- for identification of needs in the field of digital activation,
- for identification of resources and deficits in the field of digital activation,

• Projects using the potential of information and communication technologies

An example is the Orange Academy program, which has been in operation since 2010, promoting innovative projects in the field of cultural education and animation using the potential of IT.

• E-integration and E-activation

Other activities improving digital competences, including data skills, establishing a harmonious team of knowledge, skills and attitudes that allow you to effectively use digital technologies in various areas of life, including entrepreneurship development.

VII APPENDICES

APPENDIX 1: SURVEY RESULTS EUEI

1. Do you find the data management important? If so, why?

Data Management is a vitally important part of our society in today's day and age due to the technical and digital advancement. For small businesses, larger companies and even sole traders Data Management, how we store, utilize and analyze data is a vitally important process. It comes with the responsibility of hosting others' info and ensuring that this is properly dealt with.

2. How would you assess the usage of data management by entrepreneurs in your region / country?

I feel that as the awareness grows about the legalities surrounding data management entrepreneurs and companies are becoming more aware of the way in which they store and use their clients' data. The data management usage of clients' info can be used to optimize and business outputs.

3. Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?

I believe that young people who are growing up in this digital age and have advanced skills in this area and they can build on these skills through education and further education. As they are "natives" to digital technology they can meet these market needs.

4. Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country? If yes, please name them and provide us with a link to website.

From Study in Denmark:

Data Analytics for Accounting: Case-based Approach 2019	*Economics, commerce, management and accounting*	*Summer School of*	*Aarhus University (AU)*
Data Interaction Cyber Programme 1:1 DTU-KAIST	*Engineering Mathematics, natural- and computer science*	*Master (2 years) of Science in Data Interaction*	*Technical University of Denmark (DTU)*
Data Science for Business Intelligence (DSBI) 2019	*Economics, commerce, management and accounting*	*Summer School of*	*Aarhus University (AU)*

Data science in insurance 2019	*Economics, commerce, management and accounting*	*Summer School of*	*Aarhus University (AU)*
Introduction to Data Science in Python 2019	*Economics, commerce, management and accounting Mathematics, natural- and computer science*	*Summer School of*	*Aarhus University (AU)*

5. Would you recommend any good practices related to data management courses from your country or from abroad?

I believe that it is vital that Data management process and practices are taught form a young age, eg. Implemented into high school curriculum in order to stay in line with market desire and promoting employability of learners.

6. What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?

I believe that more hands on and practical implementation of data management education should be adapted, starting school education. Encouraging learners who show an affinity with this topic to continue studying this topic, highlighting the opportunities which will be open to them, also I think it is important that learners are shown the practical implications of successful and unsuccessful data management and, by using best practice examples, show the benefits.

7. In your opinion, what are the most important areas of your life in which you can use data skills?

Data skills which are required for my day job

Data skills which all my life to be much easier eg. Google, excel, Alexa etc

APPENDIX 2: SURVEY RESULTS EUCEN

2. ***How would you assess the usage of data management by entrepreneurs in your region / country?***

   Data management is powerin all society domains and history. Currently it is more relevant due to the technological developments. In education it is crucial that proper data is used in learning. There is an infinite set of data and choosing the right information in terms of scope and of veracity is crucial for learning. This is probably the main role of teachers and trainers in the next decade. Empowering individuals to handle data is also a responsibility for institutions that are in charge of the common good from universities to governments. Data management can return to the dark ages or to sustainable future depending on the quality of the management.

3. ***Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?***

   Most graduates and young entrepreneurs are not prepared for the importance of data management in a proper way. The search engines create the illusion that the results are reliable and valuable but these depend on the search rules, previous requests and starting positions. It is necessary to prepare everyone, not just graduates or young entrepreneurs, to handle data in a world where there is access to infinite data without proper guidance. Filters are necessary as well as tutoring about values and evaluation of the veracity and quality of results. Most educational programs at all levels from kindergarten to continuing education have no learning outcomes addressing data management.

4. ***Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country?***

   There is in several countries the application of the GDPR as provided in the European Directive. At national level there are national laws and regulation on privacy protection. There is no recommendation at national, regional or sectoral areas in terms of data management. Of course GDPR conditions the use of data in terms of privacy of individuals and companies but does not address a proper approach to manage data in general. Certain countries have regulations concerning financial data management. In fact, the protection of data is envisaged but there are no official recommendations about proper use of data in general. That is fundamental for a democratic society where data use may become a ubiquitous asset like money or air.

5. ***Would you recommend any good practices related to data management courses from your country or from abroad?***

   No suggestions for any course or program. There are several courses on data management and program

degrees in data managers. The recommendation of any of these depends as in all degrees and courses on quality evaluation in education and training. Choices for this type of courses depend as any other educational area on many contextual indicators. There are no rankings of these types of courses or programs.

Of course, the topic should be addressed at all levels in the educational systems and HEI could be pro-active in proposing adapted ways to different audiences.

6. ***What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?***

Definitely data management should make part of every HEI or VET program in all levels of lifelong learning. In today's society, data handling is becoming more and more complex. Everyone deals daily with a huge amount of data, generated by numerous sources. This reality causes a high demand for people with competences in the area of information management, who are able to use the most modern techniques and analytical tools to support decision making. All programs should train everyone with strong analytical skills, capable of collecting, organizing and analyzing the information, translating it into a strategic resource that allows anyone to innovate, to develop competitive advantages and to act as a responsible citizen.

7. ***In your opinion, what are the most important areas of your life in which you can use data skills?***

Competences in data management are useful in all dimensions of my life. Political: understand what fake news is or choose reliable sources is fundamental in a world where manipulation has become easier. Professional: choosing the right data that will improve the procedures used to perform better in the roles assumed as a citizen. Personal: find proper data about restaurants to attend, the best route to take home when returning from work, the best flights to travel and the most profitable investment are small examples where data management can highly influence choices and decision making. Data management is a task present at any time of the day and of the night and the competences are fundamental to take solidly grounded and conscious decisions.

APPENDIX 3: SURVEY RESULTS FELTECH

1. Do you find the topic of data management important? If so, why?

Absolutely. Big Data and Analytics are drivers of change. BY MANAGING DATA EFFICIENTLY, SOUND MANAGEMENT DECISIONS CAN BE MADE. *When "big" data is turned into actionable "smart" data, it can drive productivity, innovation and growth. Hence the topic has never been more important. Research conducted in 2012 found that there was an incremental return on investment in big data of more than 200%.*[4]

2. How would you assess the usage of data management by entrepreneurs in your region / country?

PwC's CEO Pulse Survey found that the majority of Irish business leaders (70 per cent) see data analytics as the emerging technology which offers the greatest opportunities for their businesses. At the same time, nearly half (48 per cent) said that the inability to exploit digital analytics is a threat to growth.[i]

The Irish Government has been working on developing Ireland's potential to make the most of big data. 'Assessing the Demand for Big Data and Analytics Skills, 2013-2020[5]*' was the first major report that showed how the Irish skills base and research capability in ICT has the potential to reap substantial benefits in terms of jobs and growth from the global expansion of the "Big Data" sector. However, the focus currently is very much on research (e.g. The INSIGHT Centre- The National Centre for Data Analytics*[6]*) and larger businesses as opposed to entrepreneur's usage of data management.*

The upsurge in big data in Ireland has been driven by escalating volumes of detailed information originating from companies and enterprises and the public sector, mass media and multimedia, social networking platforms and the 'Internet of Things'.

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[4] Nucleus Research (2012) – "The big returns from big data".

[5] http://www.skillsireland.ie/media/07052014-Assessing_the_Demand_for_Big_Data_and_Analytics_Skills_Full-Publication.pdf

[6] The Insight Centre for Data Analytics is a joint initiative between researchers at Dublin City University, NUI Galway, University College Cork, University College Dublin and other partner institutions. Insight brings together more than 400+ researchers from these institutions, €100m+ funding, and with over 80+ industry partners, to position Ireland at the heart of global data analytics research.

3. Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?

No. It is our experience of working with hundreds of start-up entrepreneurs including students, graduates and early stage entrepreneurs, that their knowledge of and prowess in data management is weak. They may have some basic skills but typically fail to use data to analyze all aspects of a business management and operations to make appropriate business decisions. As highlighted in the 'Assessing the Demand for Big Data and Analytics Skills, 2013-2020' report "If Ireland is to become a leading country in Europe for big data and analytics, there is a need for a step change in the awareness and image of the business area".

4. Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country? If yes, please name them and provide us with a link to website.

Assessing the Demand for Big Data and Analytics Skills, 2013-2020 put forward a number of proposals relating to learning and education. These include that

- *Computer skills should be introduced at an earlier stage in the education system*
- *There should be more focus on the teaching of maths at primary level.*
- *A problem-solving approach should be adopted in second level maths curricula.*
- *Greater female participation in analytics should be targeted from an early age.*
- *At third level, cooperation between industry and academia is crucial to ensure that education reflects skills needs. Proposals included*
    - *involving industry experts in devising curricula and teaching analytics on university programmes.*
    - *Work placements, both in industry and in research centres, should form an integral part of third level courses for students of big data and analytics and collaboration with industry is vital in this regard. In particular the*
    - *Facilitating students on relevant courses to meet people already working in the area to discuss career options is seen as an effective way to attract them to the field.*
    - *As a means of raising standards it was suggested that universities with the strongest records in maths and statistics should come together in order to offer specialized courses.*
    - *Increased funding should be provided for research to support career options for analytics in academia and to drive innovation.*
    - *Analytical modules should also feature across less technical disciplines, such as business and social sciences.*

5. ***Would you recommend any good practices related to data management courses from your country or from abroad?***

- *A Diploma in Data Analytics for Business (Springboard+) available in colleges throughout Ireland – example fromCCT. The Diploma in Data Analytics for Business aims to provide learners with a progression pathway to professional roles at entry or junior level in Data Analysis as well as the option to further their education in the area of Data Analytics. Admission to this Diploma is through one of the following:*
    - *Evidence of prior learning, including experiential learning, or*
    - *Possession of an NFQ level 5 award, including leaving certificate, FET award, or equivalent.*

  In addition, all applicants must evidence competence in mathematics equivalent to O6 standard in leaving certificate and competence in the use of IT. Basic computer literacy is not sufficient for this programme.

  The Springboard+ upskilling initiative in higher education offers free courses at certificate, degree and masters level leading to qualifications in areas where there are employment opportunities in the economy.

- *The Canadian University of Waterloo model see students equipped with 24 months of experience upon graduation. https://uwaterloo.ca/future-students/programs/data-science*

- *Courses (and careers) in Big Data Management in Ireland https://www.goireland.in/big-data-management-course-ireland*

6. ***What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?***

- *As highlighted in question 4 above, the key to improving data management education is to feature analytical modules across less technical disciplines, such as business and social sciences.*

- *Steps should also be taken to allow transition into analytics from other disciplines and up-skilling and retraining into the area should be encouraged. To this end, short courses for individuals with technical backgrounds should be provided.*

7. ***In your opinion, what are the most important areas of your life in which you can use data skills?***

- *Online Shopping. Since the growth of Big Data in retail, the entire industry is completely changing.*
- *Wearables and health (e.g. my Fitbit and the powerful data in collates for weekly).*
- *Energy Consumption.*

- *Using data skills to effectively conduct research, communications and message creation*
    - *Interesting article Big Data is Everywhere*

APPENDIX 4: SURVEY RESULTS LYIT

1. Do you find the data management important? If so, why?

Yes, in context of SMEs as they are of huge importance in Irish Industry.

Yes, even having a working of how data is collected can help young businesses and individuals make smart choices

Access to data over time is a useful way to track progress etc

Yes, it is extremely important for businesses and organizations at all levels to proactively manage and learn from data.

2. How would you assess the usage of data management by entrepreneurs in your region / country?

We believe it is not maximized. Poor knowledge of the potential of data that currently exists within their own organization.

Even though business courses have a data analysis element to them, unless an entrepreneur is coming from a computing background there is limited learning about how to attain data.

While it is important, I think that in it is limited among SMEs. Usually silo based systems that do not link together to provide meaningful information.

Poor mainly because of time constraints and staff limitations

3. Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?

No

No, focus in the latter college years is on data collection and analysis for academic dissertations.

No - they have limited and basic skills in this regard.

No. a solution might be the use of innovation vouchers to help access data analysis or links to student projects etc

4. Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country?

In higher education, many modules would contain elements of data management, such as Google Analytics, Digital Marketing, and Statistics.

Not enough for competency in the area.

No official country wide to our knowledge.

Data management is increasingly important and courses are embedding data management into modules. Again among many subjects the approach is a broad overview rather than being more in-depth. Not aware of specific benchmarks in relation to data management.

Not that I am aware.

5. Would you recommend any good practices related to data management courses from your country or from abroad?

To our knowledge, very limited.

Conference on TECH, Internet of Things, 30th May

Tech connective live

Ulster University MSc Data Science?

None come to mind

6. What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?

I would recommend that they have short directed learning courses with the possibility of accreditation and/or special achievement award/digital badge.

Accredited and focused short courses that can be taken as CPD options. These could collate to an overall award. More attractive short/flexible accreditation that is industry recognized.

Applied projects linked to SME needs

7. In your opinion, what are the most important areas of your life in which you can use data skills?

In teaching relevant smart data skills to students and application to micro and small businesses

From a student perspective, finding relevant, quality research. Business perspective, marketing and customer demand data. Ethical use of data needs to be addresses as well as how to be wary of how our own data is collected.

How to use and link data, the context of key data sets and performance and SMART real/time data - how to manage this from a small business perspective.

Tracking progression in life and work

APPENDIX 5: SURVEY RESULTS VGTU

1. Do you find the data management important? If so, why?

Yes.

First of all, data management helps to work more efficient and save the time. The organized data management helps to improve productivity of data users. Organization in this way can work faster and better: it's easier to find, track and review the data.

Effective data management is important when sharing the information between team members. Data stored in a database can be accessed also remotely.

Data stored in a database can be better protected, it can be protected with a password or opened only using authorization protocols.

Data management systems have integrated backup and recovery functions, which protects losing data after crashing or system failure.

2. How would you assess the usage of data management by entrepreneurs in your region / country?

Depending on the company size and type:

Companies, working exceptionally with data (banks and other financial institutions, etc.) and experienced enterprises (hiring data management specialists) understand the importance of the data management and its advantages.

Startups, smaller companies or companies not working with data as their main activity understand the benefits of data management and use of data management systems less: they do not have enough information on data management (to less information in educational institutions), do not want to invest time and money into data management. This leads to less efficient work and information sharing, less security and communication within the team.

3. Do you think that students/early stage entrepreneurs are skilled enough to meet the market needs of data management?

Students or early stage entrepreneurs are skilled on data management depending on the study programme:

IT specialists have few study modules which include knowledge on data management: Cloud Computing, Databases, Database Management, Database Administration, Information Security, Data Mining, etc. Management students have several related study modules: Data Analysis, Data Management. But in the other study programmes (Mechanical Engineering, Product Design, Transport Engineering) students only get the basics on data management but this topic is not directly involved in the study programmes. This means that if the person

after completing a university wants to run a start-up, he needs additional skills and education on data management.

4. Are there any official recommendations in higher education in data management in regional, national or sectoral level in your country? If yes, please name them and provide us with a link to website.

There are no national recommendations, but as an EU Member state Lithuania has to follow EU GDPR: https://eugdpr.org

The Ministry of Education and Science of Lithuania performed a research for further recommendations:

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiQoMC9i7riAhX_AxAIHb3cDysQFjAAegQIABAC&url=https%3A%2F%2Fwww.itc.smm.lt%2Fwp-content%2Fuploads%2F2010%2F12%2FDBVS-ir-kitu-alternatyvu-studija-2008.doc&usg=AOvVaw03EYug81gZvPVbFh0D-Nvq

Databases used in Lithuanian education and science institutions:

No.	***Institution***	***Object***	***Name of the database***
1.	***Ministry of education and science:***	*Management Information System*	*Microsoft Exchange Server*
2.		*Accounting*	*Sysbase,* *My SQL*
3.		*E-mail system of the ministry*	*Microsoft Exchange Server*
4.	***Education IT Center:***	*Education portal*	*Microsoft SharePoint*
5.		*Register of education and science institutions*	*Informix*
6.		*License register*	*Informix*
7.		*Register of studies and teaching programmes*	*Informix*
8.		*Registration of documents*	*Informix*
9.		*Lecturers' database*	*Microsoft SQL Server*

10.		*Students' database*	*Microsoft SQL Server*
11.		*Education management information system*	*Informix*
12.	***Educational Supply Center***	*School education programmes*	*Informix*
13.		*Textbook register*	*Postgre SQL*
14.	***National Examination Center***	*National Examination Center Information System*	*Oracle*
15.	***Schools**:*	*Scholars database*	*Paradox or Informix*
16.		*School library*	*PostgreSQL*
17.		*Education reports*	*Paradox arba Informix*
18.	***VET school***	*Students' database*	*Paradox*
19.		*Library system*	*PostgreSQL*
20.	***Higher education institutions***	*Student database*	*Oracle*
21.		*Library system*	*Oracle*
22.	***Municipalities***	*Students and scholars database*	*Paradox or Informix*
23.		*Register of education and science institutions*	*Informix*

5. Would you recommend any good practices related to data management courses from your country or from abroad?

I would recommend following EU practice (GDPR), as it is well prepared and applicable to all our neighbors and collaborating countries. This means we can collaborate between countries efficiently, with a common view and understanding on data security and management.

6. What would you improve in data management education if you could be empowered to implement changes in HEI and VET institutions?

I would add more topics on data management: managers, engineers, artists – everyone has to gain this knowledge. We are encouraging startups in our university. Each entrepreneur needs the understanding on:

- *data governance and data quality management*
- *database management systems*

- *data analytics/data mining*
- *enterprise content management*
- *big data management, etc.*
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7. In your opinion, what are the most important areas of your life in which you can use data skills?

The most important application of data management is in professional work:

- *Personal data protection (e.g. product design)*
- *Customer databases*
- *Better CRM*
- *Information distribution between employees and teams*
- *Company data security*
- *To make company services more efficient*
- *To help employees work faster/more efficient*
- *To improve communication inside the company*

These areas are important not just for the companies working with data, but for each company which seeks to expand and to improve its efficiency and profit. Person with data management skills is a valuable employee.

[i] https://www.irishtimes.com/sponsored/pwc/data-analytics-an-underutilised-resource-for-irish-businesses-1.3621902