Contents

LIGHTKEY
TYPING.REDEFINED

Recommendation Guide

Lightkey as a Composition Tool

Categorised as a composition tool within Student Loans Company (SLC)'s current product list, Lightkey supports the process of writing itself, rather than simply correcting spelling and grammar after text has been produced:

[https://www.practitioners.slc.co.uk/media/1457/product-list-software.xlsx]

The term *composition* refers to *"the act of forming or putting together parts to create a whole, especially in writing"* (Oxford Languages). In an academic context, this includes the ability to generate ideas, structure sentences, organise thoughts, and express meaning clearly in written form.

For many disabled students, these aspects of composition, not just spelling accuracy, present the greatest barrier. Based on underlying symptoms, difficulties can include:

- Initiating writing or getting started
- Structuring sentences and maintaining coherence
- Sequencing ideas logically
- Word retrieval and forming appropriate phrasing
- Sustaining writing flow without interruption
- Managing the cognitive load of writing while simultaneously attending to spelling, grammar, and structure

Lightkey directly supports these core components of composition through its functionality. It provides predictive word and phrase suggestions in real time, supporting the construction of sentences as an individual writes. It supports the process of composing written language, addressing key disability-related difficulties.

How Lightkey Supports Composition

Lightkey provides real-time, proactive writing support, enabling users to construct sentences as they write. Its key features include:

- Predictive text at word and phrase level: supports sentence construction and idea generation
- Real-time suggestions: reduces pauses and maintains writing flow
- Adaptive learning: tailors suggestions to the individual's writing style and subject-specific vocabulary
- Reduced keystrokes: lowers both physical effort and cognitive demand
- Cross-application functionality: supports writing across platforms, not just within a word processor

This means Lightkey supports the formation of written language, rather than simply identifying errors after the fact.

Free tools such as Microsoft Word or Google Docs primarily provide retrospective support:

- Errors are identified *after writing has occurred*
- The user must already have generated the sentence
- Corrections rely on rule-based systems
- Limited support for idea generation or sentence construction

In contrast, Lightkey:

- Supports writing in real time (during composition)
- Assists with word finding, phrasing, and sentence development
- Learns from the user, becoming increasingly personalised
- Reduces cognitive load, allowing focus on meaning rather than mechanics

While there may be surface-level overlap in outcomes (e.g. improved written work), the functional differenc**e** between tools is significant and should be considered in relation to an individual student's needs.

Mind mapping tools support the planning stage of writing, helping students to organise ideas, generate content, and structure thoughts, but this is generally before writing begins. For many students, particularly those with difficulties in organisation or idea generation, this is an important and appropriate intervention. Mind mapping supports what a student wants to say; Lightkey supports how they are able to write it.

However, planning alone does not address the challenges that arise during the act of writing itself or composition.

Across a range of disability types, students may experience difficulties at the point of composition, including:

- **Specific Learning Difficulties (SpLD)**: difficulties with spelling, word retrieval, sequencing, and sentence structure
- **Dyspraxia**: difficulties with motor coordination, typing fluency, and written organisation
- **ADHD**: difficulties sustaining attention, maintaining writing flow, and initiating or completing written tasks
- **Autism Spectrum Condition (ASC)**: difficulties with language formulation, structuring written expression, and translating ideas into written form
- **Mental Health conditions**: reduced motivation, cognitive fatigue, and difficulty initiating or sustaining writing
- **Physical disabilities**: reduced dexterity, pain, fatigue, and increased effort required for typing
- **Vision loss/visual impairment**: visual fatigue, tracking difficulties, and increased effort in reading and reviewing text
- **Hearing loss**: challenges with phonological processing, spelling, and written language structure
- **Dyscalculia**: difficulties with sequencing, working memory, and organising written information

Difficulties often occur not only in planning, but in converting planned ideas into coherent written text. Lightkey, therefore, operates at this critical stage of the process. It supports composition in real time, assisting with sentence construction, word retrieval, and maintaining writing flow as ideas are translated into written language:

- Mind mapping tools support planning *before writing begins*
- Spelling and grammar tools support correction *after writing occurs*
- Lightkey operates during writing itself, supporting the live construction of text
- Offline functionality ensures data privacy and reliability

This positions Lightkey as a *process-based intervention*, rather than a planning or editing tool. The presence of word suggestions within Lightkey does not make it equivalent to a spelling and grammar tool; rather, these features function as part of a wider system designed to reduce cognitive load, support language formulation, and enable continuous written expression.

For disabled students, this distinction is critical. Difficulties arise from the process of composing written language itself, including initiating writing, structuring sentences, retrieving appropriate vocabulary, and maintaining coherence. During the act of writing, multiple demands whether cognitive,

processing, physical or all of these challenges combined (language, structure, spelling, motor input) must be managed simultaneously. Free tools do not address these challenges in real time, they only address errors retrospectively as they rely on the user already having produced text. Lightkey, by contrast, provides proactive, in-the-moment support, enabling students to generate and structure writing as it is being produced.

Lightkey reduces this burden at the point of composition, enabling:

- Continuous writing without disruption
- Reduced anxiety associated with errors
- Improved fluency and coherence
- Greater independence in academic writing

Lightkey addresses a different stage of the writing process and meets distinct disability-related needs.

Its primary function is to support the generation, structuring, and expression of written language in real time, making it particularly appropriate for students who experience barriers in written composition.

Why Lightkey Provides Enhanced Support for Written Composition

Lightkey supports the real-time construction of written language, rather than focusing solely on the correction of errors.

While freely available tools such as Microsoft Word and Google Docs provide spelling and grammar checking, their functionality is primarily corrective and retrospective. These tools identify and suggest corrections only after text has already been written, requiring the user to independently generate spelling, phrasing, and sentence structure before support is provided.

For many disabled students, this presents a significant barrier. Difficulties often arise during the process of composing written language, rather than solely in identifying errors after the fact. As a result, free tools do not adequately address the underlying challenges associated with written expression.

Lightkey differs fundamentally in both function and purpose. It provides real-time, predictive support during composition, assisting students to construct sentences as they write. This enables:

- **Reduced cognitive load**: students are not required to simultaneously manage spelling, structure, and idea generation
- **Improved writing fluency**: fewer interruptions to correct errors or

search for words
- **Enhanced word retrieval and phrasing**: particularly beneficial where vocabulary access or sentence construction is impaired
- **Reduced physical effort**: fewer keystrokes required, supporting those with motor difficulties
- **Sustained writing flow**: minimising disruption caused by error correction processes

In contrast, free tools:

- Require the student to produce text independently before support is available
- Provide rule-based corrections, which may be contextually inappropriate
- Do not meaningfully adapt to the individual's writing style or subject-specific language
- Do not reduce the real-time cognitive and physical demands of writing

Lightkey also provides context-aware, adaptive support, learning from the individual user over time and tailoring predictions to their writing patterns and academic discipline. This supports the development of coherent, structured written expression, rather than simply correcting isolated errors.

Lightkey's AI Functionality

Lightkey's AI is assistive, non-generative, local, and user-led. Unlike tools designed to replace the content creation process, Lightkey's goal is to enhance and accelerate writing through personalised, user-driven predictions. Once installed, Lightkey's suggestions are intentionally minimal and non-disruptive, focusing first on learning each user's unique writing style. Over time, as it becomes more familiar with the user's tone, vocabulary, and context, Lightkey gradually increases the number of its suggestions and spelling corrections.

Behind the scenes, Lightkey operates using seven distinct language models. The core AI language model is static, meaning it provides a foundational understanding but does not learn or adapt. The other models are dynamic as they continuously evolve based on the user's typing patterns, allowing Lightkey to personalise predictions with increasing precision. Lightkey is intelligent, and uses AI to learn from the user's writing patterns. However, it is built with user privacy at its core, All 'learning' takes place locally on the user's device.The AI or intelligence works within strict boundaries - learning from user input, and is therefore,user-centered AI. Lightkey's AI features should be distinguished from generative AI tools that create original academic content. Its functionality is assistive rather than substitutive: it supports the student's own writing in real time, learns from the individual user locally on-device, and does not replace authorship. In this way, AI can improve support where it reduces barriers without replacing the student's own academic thinking.

Importantly, Lightkey is also an offline solution, which means that all processing occurs locally on the user's device, ensuring that work and data remain completely private and secure at all times.

Support across physical and chronic conditions

Lightkey takes account of differing disability types and offers support across physical and chronic conditions. Its Toggle Button is designed to optimise Lightkey's behaviour, allowing it to strike the right balance between prediction accuracy and coverage of user preferences.

Each time a key is pressed, the system processes the input within milliseconds. Lightkey groups recent keystrokes, evaluates all the possible outcomes, and determines the most relevant and confident prediction to display. Behind the scenes, Lightkey continually adjusts how many suggestions it offers.

Fewer suggestions increase precision but reduce keystroke coverage; more suggestions will increase keystroke coverage but may introduce inaccurate suggestions which negatively impact the user experience. To manage this trade-off, the developers have established an optimal working threshold for most users (a sweet spot), alongside a specialised setting tailored to individuals with physical conditions that affect manual dexterity and the mechanics of writing and typing.

The rationale is rooted in cognitive effort. Each time a prediction appears, the user must make a quick decision about whether it is useful. When predictions are accurate, this mental task feels rewarding; when they are not, it can drain attention and energy, difficult where a diagnosed condition also brings these symptoms. For the general population, Lightkey's standard configuration provides an optimal balance - delivering accurate, contextually appropriate suggestions without overwhelming the user. However, for users with physical challenges, typing itself demands significantly more effort. To reduce both physical and cognitive load, Lightkey's decision-making process, via the toggle button, has been re-engineered to become more proactively suggestive, offering broader text coverage and more visible predictions, while maintaining a high level of accuracy. This adaptive design ensures that every user, regardless of typing ability and disability type, benefits from a tailored experience that supports efficiency, productivity, comfort, and accessibility.

Difficulties helped by Lightkey across disability types

Specific Learning Difficulty (SpLD)

Writing and Reviewing Academic work

Given the student's profile of Specific Learning Difficulty (SpLD), significant challenges can arise in the process of written composition. These can include:

- Reduced working memory capacity, impacting the ability to hold and manipulate information while writing
- Slower processing speed, affecting the ability to generate and organise written language efficiently
- Difficulties with word retrieval and sentence construction
- Reduced ability to sequence ideas and maintain coherence
- Difficulties with sustaining attention and maintaining writing flow
- Increased cognitive load, particularly when managing multiple demands (content, structure, spelling, and typing simultaneously)

As a result, writing tasks can become fragmented, effortful, and time-consuming, with frequent disruptions to thought processes.

Lightkey as a specialist composition tool is designed to support the student during the act of writing or composition. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, rather than relying on retrospective correction. Standard tools such as Microsoft Word or Google Docs primarily offer post-error correction, requiring the student to independently generate text before support is provided. This places continued demand on working memory, processing, and attention, and does not address the underlying difficulties in composing written language. While tools such as mind mapping can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting appropriate vocabulary, and maintaining meaning. The demands of spelling, phrasing, and sentence construction represent one part of this wider composition process.

How Lightkey Supports Composition

1. Reducing Cognitive Load and Supporting Working Memory
Lightkey reduces the need to independently generate spelling, phrasing, and sentence structure simultaneously. By offering context-aware predictions during

writing, it supports the student in holding and developing ideas without losing track of meaning. In contrast, standard word processing tools require the student to manage these processes independently before corrections are offered.

2. Supporting Writing Fluency and Processing Speed
Real-time word and phrase prediction reduces pauses associated with searching for vocabulary or correcting errors. This enables a more continuous writing process. Standard tools interrupt this process by requiring the student to stop, review, and amend errors after they occur, which can further slow writing speed.

3. Supporting Attention and Task Persistence
By minimising interruptions and reducing the need to constantly shift between writing and correcting, Lightkey supports sustained attention and task engagement. In contrast, frequent prompts, underlining, and correction processes in standard tools can disrupt focus and contribute to cognitive fatigue. This is helpful where concentration and processing are poor.

4. Supporting Word Retrieval and Sentence Construction
Lightkey provides contextually appropriate suggestions, supporting the formulation of sentences in real time. This is particularly beneficial for students with SpLD, where difficulties with word retrieval, sequencing, and constructing coherent sentences can interrupt the flow of writing and increase cognitive effort. By offering predictive support during writing, Lightkey reduces the demand on working memory and processing, enabling the student to translate ideas into written language more efficiently and with fewer disruptions. This supports the development of continuous, meaningful written expression, rather than fragmented output.

While other tools may support aspects of planning or offer correction after writing has occurred, they do not typically provide the same level of in-the-moment support for constructing sentences. Lightkey addresses this gap by assisting directly at the point where students with SpLD often experience the greatest difficulty, formulating and expressing ideas in written form.

5. Improving Coherence and Organisation at Sentence Level
Lightkey supports the development of coherent written expression as it is being composed. Standard tools focus on accuracy at word or sentence level after production, rather than supporting the construction of meaning. For students with SpLD and associated attentional or processing difficulties, constructing logically ordered and meaningful sentences can place significant demands on working memory and cognitive processing. This can result in writing that is disjointed or lacks coherence, particularly where attention fluctuates or ideas are lost during the writing process.

By providing context-aware, real-time support, Lightkey helps the student to structure sentences more effectively as they are formed, supporting clarity, continuity, and overall coherence. This reduces the need to revisit and reorganise text after it has been written, which can be cognitively demanding

and disruptive to focus.

While some tools support accuracy once text has been produced, they do not typically assist with the organisation of meaning during composition. Lightkey addresses this by supporting the construction of coherent written language in real time, helping the student to express ideas in a more structured and connected way.

Additional benefits include:

- **Reduced cognitive load:** supports working memory and processing
- **Dyslexia-friendly writing support**: with 60 + Specialist Subject Dictionaries including Law, Economics and Medicine *Lightkey Medical
- **Improved writing fluency:** supports continuous composition
- **Distraction-free interface:** supports focus
- **Customisable colour themes:** enhance usability/readability
- **Optional read-aloud functionality:** supports multi-sensory reinforcement
- **Integration with text-to-speech tools:** enhances accessibility
- **Offline functionality:** ensures data privacy and reliability

Where the primary difficulty lies in the generation, organisation, and structuring of written language, particularly where working memory, processing speed, word retrieval, and sequencing are affected, Lightkey addresses these challenges by supporting the real-time composition of written language, reducing cognitive load, supporting sentence construction, and enabling more fluent, coherent, and continuous writing.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with Specific Learning Difficulties (SpLD).

Dyspraxia

Writing and Reviewing Academic work

Given the student's profile of dyspraxia, this can bring significant challenges in the process of written composition, particularly where difficulties with motor coordination interact with cognitive demands. These may include:

- Reduced fine motor control, impacting typing accuracy and fluency
- Increased physical effort and fatigue during writing tasks
- Slower processing speed, affecting the ability to generate and organise written language efficiently
- Difficulties with sequencing ideas and structuring written output
- Challenges in sustaining writing flow, due to interruptions caused by errors or physical effort
- Increased cognitive load, particularly when managing both the physical act of typing and the formulation of language simultaneously

As a result, writing tasks can become slow, effortful, and fragmented, with frequent disruptions to both physical and cognitive processes.

Lightkey can offer support as a specialist composition tool to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, while significantly reducing the physical and cognitive demands associated with typing.

Standard tools such as Microsoft Word or Google Docs primarily offer post-error correction, requiring the student to produce text independently before support is provided. This does not address the combined motor and compositional difficulties experienced during writing. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language. Also, at times, strategies such as mindmapping may be unsuitable given the nuances of the condition.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. The physical act of typing and the formulation of language occur simultaneously during this process, which can present significant barriers for students with dyspraxia. Lightkey supports this process by reducing both the mechanical demands of typing and the cognitive demands of language formulation, enabling more efficient and continuous

written expression.

How Lightkey Supports Composition

1. Reducing Cognitive and Physical Load
Lightkey reduces the need for continuous manual input by predicting words and phrases after only a few keystrokes. This lowers the physical effort required for typing while also reducing the cognitive demand associated with generating spelling, phrasing, and structure simultaneously. This is particularly beneficial where motor coordination difficulties increase effort and fatigue.

2. Supporting Writing Fluency and Processing Speed
Real-time predictive support reduces the need to stop and correct errors or retype words, enabling a more continuous writing process. This supports fluency and helps to mitigate the impact of slower processing speed and physical interruptions.

3. Supporting Attention and Task Persistence
By reducing the need for repeated corrections and minimising disruptions caused by typing errors, Lightkey supports sustained engagement in writing tasks. This is particularly helpful where effortful typing contributes to reduced concentration and task fatigue.

4. Supporting Sentence Construction and Sequencing
Lightkey provides contextually appropriate suggestions, supporting the formulation and sequencing of sentences in real time. This helps the student to organise ideas more effectively as they are written, reducing the fragmentation that can occur when physical effort interrupts the writing process.

5. Improving Coherence and Organisation at Sentence Level
Lightkey supports the development of coherent written expression as it is being composed. By assisting with sentence structure and flow in real time, it enables the student to maintain continuity of thought, reducing the need to revisit and reorganise text after writing, which can be both physically and cognitively demanding.

Adaptive Support for Motor Difficulties:

Lightkey includes adaptive functionality designed to account for differences in typing ability. Its predictive system processes keystrokes in real time and adjusts the level of suggestion provided, enabling a balance between accuracy and coverage.

Where typing is more effortful, Lightkey can be configured to provide broader predictive support, increasing text coverage and reducing the number of keystrokes required. This helps to minimise physical strain while maintaining

effective writing output.

By reducing both physical effort and cognitive demand, Lightkey supports a more accessible and efficient writing experience for students with dyspraxia.

Additional Accessibility Benefits:

- **Reduced keystrokes**: minimises physical strain and fatigue
- **Distraction-free interface:** supports focus during effortful tasks
- **Specialist subject dictionaries**: supports academic vocabulary
- **Customisable visual settings**: improves readability
- **Optional read-aloud functionality**: supports multi-sensory reinforcement
- **Integration with text-to-speech tools**: enhances accessibility
- **Offline functionality**: ensures data privacy and reliability

The application's specialist correction minimises typing errors, aiding coordination challenges. Colour-coded themes add clarity and can reduce visual confusion where there are coordination difficulties. Keyboard shortcuts streamline writing processes.

ADHD

Writing and Reviewing Academic work

Given the student's profile of ADHD, this can bring significant challenges associated with the process of written composition, particularly where difficulties with attention, concentration, and executive functioning impact the ability to sustain and organise written work. These may include:

- Difficulties with sustaining attention and maintaining focus during writing tasks
- Reduced ability to initiate and maintain writing momentum
- Challenges with working memory, affecting the ability to hold and develop ideas while writing
- Difficulties with organising and sequencing thoughts into coherent written language
- Increased susceptibility to distraction and interruption
- Increased cognitive fatigue, particularly when managing multiple demands simultaneously (content, structure, spelling, and typing)

As a result, writing tasks may become inconsistent, fragmented, and difficult to sustain, with frequent loss of focus and disruption to the flow of ideas. **Lightkey** supports in a role as a specialist composition tool to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, supporting continuity of thought and reducing interruptions.

Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently generate text before support is provided. This can interrupt attention, increase cognitive load, and disrupt writing flow, particularly for students with ADHD. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with ADHD, the primary difficulty often lies not only in accuracy, but in sustaining the cognitive processes required to produce and maintain written expression over time. Lightkey supports this process by reducing the cognitive effort required during writing and enabling more continuous and supported composition.

How Lightkey Supports Composition

1. Supporting Attention and Sustained Focus

Maintaining attention is key for individuals with ADHD, and Lightkey supports the student to remain in the writing “zone” by reducing the need to pause and correct errors. By minimising interruptions and supporting writing in real time, it helps sustain focus and engagement throughout the task.

2. Supporting Initiation and Writing Momentum
Students with ADHD may experience difficulty getting started or sustaining effort once writing begins. Lightkey’s predictive suggestions act as prompts, helping the student to generate ideas and begin writing. These prompts also support continued writing momentum, reducing the likelihood of disengagement and supporting task completion.

3. Reducing Cognitive Load and Supporting Working Memory
Lightkey reduces the need to manage spelling, phrasing, and sentence construction simultaneously. This enables the student to hold and develop ideas more effectively without losing track of meaning.

4. Supporting Writing Fluency and Processing Efficiency
Real-time word and phrase prediction reduces pauses associated with searching for vocabulary or correcting errors. This supports a more continuous writing process and reduces cognitive fatigue.

5. Supporting Sentence Construction and Organisation
Lightkey provides contextually appropriate suggestions, supporting the formulation of sentences as they are written. This helps the student organise thoughts more effectively and reduces fragmentation in written output.

6. Improving Coherence and Continuity
By supporting the construction of sentences in real time, Lightkey enables the student to maintain a clear line of thought, reducing the likelihood of losing ideas or producing disjointed writing.

Essentially, Lightkey offers adaptive and personalised support. Lightkey learns from the individual user over time, adapting to their writing style, vocabulary, and subject-specific language. This personalised support promotes greater consistency and reduces the cognitive effort required to produce academic writing. Its AI functionality is assistive rather than generative, meaning it supports the student’s own writing without producing original content independently. All processing occurs locally on the device, ensuring data privacy and alignment with academic integrity requirements.

Additional benefits include:

- **Distraction-reduced interface**: supports focus and attention
- **Reduced keystrokes**: lowers effort and supports sustained engagement
- **Optional read-aloud functionality**: supports multi-sensory reinforcement
- **Integration with text-to-speech tools**: enhances accessibility
- **Specialist subject dictionaries**: supports academic vocabulary
- **Offline functionality**: ensures data privacy and reliability

Where the primary difficulty lies in sustaining attention and managing the

cognitive demands of written composition over time, Lightkey addresses these challenges by supporting the real-time construction of written language, reducing interruptions, and enabling more consistent and fluent writing. As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with ADHD.

Autism Spectrum Condition (ASC)

Writing and Reviewing Academic work

Given the student's profile of Autism Spectrum Condition (ASC), there are likely to be significant challenges associated with the process of written composition, particularly where differences in language processing, organisation, and sensory regulation impact written expression. These may include:

- Difficulties with initiating and structuring written work
- Challenges in translating ideas into coherent written language
- Differences in language processing, affecting sentence construction and expression
- Difficulties with sequencing and organising ideas logically
- Increased anxiety related to making errors or producing written work
- Sensory and attentional differences, impacting focus and tolerance for writing tasks

As a result, writing may feel overwhelming, effortful, or difficult to begin and sustain, with potential impacts on confidence and academic performance. **Lightkey** can offer support as a specialist composition tool to support an individual during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, supporting clarity, structure, and continuity.

Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently generate text before support is provided. This can increase cognitive demand and contribute to anxiety, particularly where there is concern about making mistakes or difficulty structuring language. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where there is a difficulty translating ideas into structured written language.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with ASC, difficulties often arise in structuring and expressing ideas in a linear written format, rather than in conceptual understanding.

Lightkey supports this process by providing structured, predictable, and context-aware support during writing, enabling more accessible and manageable composition.

How Lightkey Supports Composition

1. Reducing Anxiety and Supporting Confidence in Writing
Students with ASC may experience heightened anxiety around making mistakes or producing written work. Lightkey reduces the likelihood of visible errors by supporting writing in real time, helping to create a calmer and more encouraging writing experience. This can reduce frustration associated with constant corrections and improve confidence.

2. Supporting Initiation and Expression of Ideas
Lightkey provides predictive word and phrase suggestions that act as scaffolding, helping the student to begin writing and translate ideas into written form. This is particularly beneficial where there are difficulties initiating tasks or structuring language independently.

3. Supporting Sentence Construction and Language Processing
Context-aware predictions support the formulation of sentences as they are written, aiding language processing and reducing the effort required to construct appropriate phrasing. This supports clearer and more effective written expression.

4. Improving Structure, Coherence, and Organisation
Lightkey supports the organisation of written language at sentence level, helping the student to produce more logically structured and coherent writing. This reduces the need to revisit and reorganise text after writing, which can be cognitively demanding.

5. Supporting Focus and Reducing Sensory Overload
Lightkey's clean and distraction-reduced interface supports concentration and reduces sensory overwhelm, which can otherwise impact the student's ability to engage with writing tasks.

6. Providing Predictability and Personalisation
Lightkey learns from the individual user over time, adapting to their writing style, vocabulary, and subject-specific language. This creates a more predictable and consistent writing experience, which can be particularly beneficial for students who prefer routine and structure.

Essentially, Lightkey offers adaptive and personalised support. Lightkey's AI functionality is assistive rather than generative, meaning it supports the student's own writing without producing original content independently. Its predictions are based on the user's own input and develop over time, supporting personalisation and consistency.

All processing occurs locally on the device, ensuring data privacy and alignment with academic integrity requirements.

Additional benefits include:

- **Distraction-reduced interface**: supports focus and reduces sensory overload

- **Predictive phrase support**: aids expression and coherence
- **Reduced cognitive load**: supports language processing
- **Optional read-aloud functionality**: supports multi-sensory reinforcement
- **Integration with text-to-speech tools**: enhances accessibility
- **Offline functionality**: ensures data privacy and reliability

Where a student's primary difficulty lies in structuring and expressing ideas in written form, alongside managing anxiety and cognitive demands during composition, Lightkey addresses these challenges by supporting the real-time construction of written language, providing structured, predictable, and adaptive support.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with ASC.

Mental Health

Writing and Reviewing Academic work

A mental health profile can bring significant challenges to the process of written composition, particularly where difficulties with motivation, anxiety, and executive functioning impact the ability to initiate, sustain, and complete written work. These may include:

- Reduced motivation and task initiation, making it difficult to begin writing
- Difficulties with sustaining attention and maintaining writing momentum
- Reduced processing speed and cognitive energy, particularly during periods of low mood or fatigue
- Challenges with organising and structuring ideas into coherent written language
- Increased anxiety related to writing tasks, including fear of making mistakes or producing work that is not “good enough”
- Tendencies toward perfectionism, leading to over-editing, avoidance, or delayed completion

As a result, composition may feel overwhelming, effortful, and difficult to sustain, with increased likelihood of avoidance, disruption to thought processes, and reduced confidence. **Lightkey** as a specialist composition tool is designed to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, reducing effort and supporting continuity.

Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently generate text before support is provided. This can increase pressure, disrupt flow, and contribute to anxiety where there is concern about accuracy or performance. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students experiencing mental health difficulties, challenges often arise across the full composition process, particularly in initiating writing, sustaining effort, and managing the cognitive and emotional demands involved. Lightkey supports this process by providing scaffolded, real-time support, making writing more accessible and manageable.

How Lightkey Supports Composition

1. Supporting Task Initiation and Reducing Avoidance
Where there are difficulties with motivation or initiating tasks, Lightkey provides a scaffolded approach to writing. Its predictive suggestions act as prompts, helping the student to get started and reducing the sense of overwhelm associated with a blank page.

2. Supporting Writing Momentum and Sustained Engagement
Lightkey helps maintain writing flow by reducing the need to pause and make decisions about spelling, phrasing, or structure. This supports continued engagement and reduces the likelihood of disengagement or task abandonment.

3. Reducing Cognitive Load and Fatigue
By predicting and completing words and phrases in real time, Lightkey reduces the mental effort required during writing. This is particularly beneficial where energy levels, processing speed, and cognitive capacity fluctuate, such as during periods of low mood, anxiety, or burnout.

4. Reducing Anxiety and Supporting Confidence
Lightkey supports writing in a way that minimises visible errors during composition, reducing anxiety associated with making mistakes. This can create a more positive and less pressured writing experience, particularly where perfectionism or fear of failure is present.

5. Supporting Organisation and Coherent Expression
Context-aware predictions support the formulation and structuring of sentences as they are written, helping the student organise ideas more effectively and produce clearer, more coherent written work.

6. Providing Consistency and Predictability
Lightkey adapts to the individual over time, learning their writing style and vocabulary. This creates a more consistent and predictable writing experience, which can support confidence and reduce uncertainty during writing tasks.

Essentially, Lightkey offers adaptive and personalised support. Lightkey's AI functionality is assistive rather than generative, meaning it supports the student's own writing without producing original content independently. Its predictions are based on the user's own input and develop over time, supporting personalisation and consistency. All processing also occurs locally on the device, ensuring data privacy and alignment with academic integrity requirements, reducing any additional anxieties.

Additional benefits include:

- **Distraction-reduced interface:** supports focus where concentration is reduced
- **Reduced keystrokes:** lowers effort and supports writing during low-energy periods
- **Predictive support:** reduces overthinking and supports decision-making

- **Optional read-aloud functionality:** supports multi-sensory reinforcement
- **Integration with text-to-speech tools:** enhances accessibility
- **Specialist subject dictionaries:** supports academic vocabulary
- **Offline functionality:** ensures data privacy and reliability

Where a student's primary difficulty lies in initiating, sustaining, and managing the cognitive and emotional demands of written composition, Lightkey addresses these challenges by supporting the real-time construction of written language, reducing effort, supporting confidence, and enabling more consistent and manageable writing.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students experiencing mental health difficulties.

Physical disability

Writing and Reviewing Academic work

Given the student's diagnosis, significant challenges can arise with the process of written composition, particularly where difficulties with the mechanics of writing and typing impact the ability to produce written work efficiently. These may include:

- Reduced dexterity and fine motor control, affecting typing accuracy and speed
- Difficulties with handwriting and keyboard use, impacting written output
- Reduced strength and endurance, leading to fatigue during writing tasks
- Increased pain or discomfort when typing for sustained periods
- Slower processing and output speed, due to the physical effort required
- Difficulty sustaining writing effort, particularly for longer academic tasks
- Increased cognitive load, where physical effort interferes with the ability to focus on language and meaning

As a result, writing tasks may be slow, effortful, and physically demanding, with interruptions to both the mechanical and cognitive aspects of composition.

Given the disability-related needs, **Lightkey** can offer several advantages. Lightkey is a specialist composition tool designed to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences while significantly reducing the physical effort required to produce text.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with physical disabilities, the mechanical effort required to produce text can interfere with this process, making it difficult to sustain attention to content and meaning. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language.

Lightkey supports composition by reducing the physical and cognitive demands of producing written language, enabling the student to focus more effectively on expressing ideas.

Standard tools such as Microsoft Word or Google Docs require full manual input of words and rely on post-error correction, which does not address the physical demands of typing or the effort required to produce written work.

While speech-to-text (STT) may be appropriate in some contexts, there are situations within academic settings where its use may not be practical or permitted. Lightkey therefore provides an effective alternative for supporting

written composition via keyboard input. Even where STT technology can be used, there are scenarios during course delivery where the use of STT is not possible or inappropriate, and Lightkey offers an alternative for keyboard input.

Lightkey includes adaptive functionality that responds to individual typing patterns. Its predictive system processes keystrokes in real time and adjusts the level of support provided.

Where typing is more effortful, Lightkey can operate in a more proactive mode, increasing prediction coverage and reducing the number of keystrokes required. This helps balance accuracy, effort, and usability, ensuring the system remains supportive without increasing cognitive demand.

This adaptive approach ensures that the student receives a tailored level of support, reducing both physical strain and mental effort during writing.

Lightkey's Toggle Button is also designed to optimise its performance by balancing prediction accuracy with coverage of user preferences. Each time a key is pressed, Lightkey analyses the input in milliseconds. grouping recent keystrokes, evaluating possible outcomes, and displaying the most relevant prediction. Behind the scenes, it also adjusts how many suggestions to show.

Fewer suggestions increase precision but reduce coverage; more suggestions expand coverage but risk adding less accurate predictions. To balance this trade-off, Lightkey uses an optimal default setting for most users and a specialised mode for individuals with physical conditions that affect typing. This design is based on cognitive effort. Each prediction requires a quick mental decision, useful suggestions feel rewarding, while inaccurate ones can be distracting or tiring. For most users, the standard setting delivers accurate, context-aware predictions without overload. For users with physical challenges, however, typing demands more effort. To reduce both physical and mental strain, the toggle button can switch Lightkey into a more proactive mode, offering broader text coverage and more visible predictions while maintaining accuracy. This adaptive approach ensures every user, regardless of ability, receives a tailored experience that enhances comfort, efficiency, and accessibility.

With traditional word processors/free spelling and grammar tools, several interface navigation steps are required to correct errors. Lightkey corrects spelling and grammar mistakes without the need for backspacing or mouse use to correct errors. This is a key accessibility benefit not available with a free tool. Where there are difficulties with the mechanics of typing, Lightkey reduces repetitive motion, which can help with fatigue or pain.

Lightkey can help address problems with physical exhaustion arising from a diagnosis. With Lightkey, it is possible to complete work more quickly and with fewer movements.

Lightkey assists students during episodes of brain fog, helping to express ideas more fluently without searching for words, supporting memory and word

finding issues, this degree of support is not available in a standard word processor or with free spelling and grammar tools.

Lightkey works with alternative input devices for accessibility. Lightkey's reduced typing demand makes it better suited to assistive setups.

How Lightkey Supports Composition

1. Reducing Physical Effort and Fatigue
Lightkey predicts and completes words and phrases after only a few keystrokes, significantly reducing the amount of typing required. This minimises repetitive movement, reduces strain, and supports longer periods of writing with less fatigue.

2. Supporting Writing Fluency Despite Motor Difficulties
By reducing the need for continuous manual input and correction, Lightkey enables a more continuous writing process, even where typing is slow or effortful. This helps maintain flow and reduces disruption caused by physical limitations.

3. Reducing Cognitive Load Associated with Physical Effort
Where significant effort is required to type, cognitive resources may be diverted away from composition. Lightkey reduces this burden, allowing the student to focus on language, structure, and meaning rather than the mechanics of typing.

4. Minimising the Need for Error Correction and Repetitive Movements
Lightkey supports inline corrections and predictive completion, reducing the need for backspacing, cursor movement, or mouse use. This is particularly beneficial where repetitive actions increase discomfort or fatigue.

5. Supporting Expression During Fatigue or "Brain Fog"
Where physical conditions fluctuate, Lightkey supports word retrieval and sentence construction, enabling the student to express ideas more easily even when processing speed or energy levels are reduced.

Additional benefits include:

- **Reduced keystrokes**: minimises physical strain and effort
- **Support for alternative input methods**: compatible with assistive setups
- **Distraction-reduced interface**: supports focus during effortful tasks
- **Optional read-aloud functionality**: supports multi-sensory reinforcement
- **Integration with text-to-speech tools:** enhances accessibility
- **Specialist subject dictionaries**: supports academic vocabulary
- **Offline functionality**: ensures data privacy and reliability

Where difficulties present in mechanical and physical demands of producing written work, which can significantly impact the overall process of composition, Lightkey addresses these challenges by reducing the effort required to generate

written language, supporting both physical accessibility and cognitive engagement.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with physical disabilities.

Dyscalculia

Writing and Reviewing Academic work

Given the student's profile of dyscalculia, significant challenges associated with the process of written composition can arise, particularly where difficulties with sequencing, working memory, and organisation impact the ability to structure and produce written work. These may include:

- Difficulties with sequencing information, affecting sentence structure and logical flow
- Reduced working memory capacity, impacting the ability to hold and organise ideas while writing
- Challenges with structuring and organising written expression
- Difficulties with processing and integrating numerical or structured information within written work
- Increased cognitive load, particularly when managing multiple elements of writing simultaneously
- Anxiety related to numbers, structure, or accuracy, which may extend into written tasks
- Reduced confidence in organising and presenting information clearly

As a result, writing tasks may become disjointed, effortful, and difficult to structure, with increased likelihood of disruption to thought processes and reduced fluency.

Lightkey is a specialist composition tool designed to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, supporting structure, sequencing, and continuity.

Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently generate text before support is provided. This does not address the underlying difficulties in sequencing, structuring, and organising written language. While tools such as mind mapping software can support the planning stage of writing, helping students to organise ideas before writing begins, they do not address the challenges that arise during the act of composition itself, particularly where students experience difficulty translating ideas into structured written language. Also, at times, strategies such as mindmapping may be unsuitable given the nuances of the condition.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with dyscalculia, difficulties often arise in the organisation, sequencing, and structuring elements of this process, rather than in content knowledge alone.

Lightkey supports this process by providing structured, real-time support during writing, helping to organise language as it is being produced.

How Lightkey Supports Composition

1. Supporting Sequencing and Organisation of Ideas
Lightkey's predictive word and phrase suggestions support the logical progression of sentences, helping the student organise ideas more effectively as they write. This reduces difficulties with sequencing and supports clearer written structure.

2. Reducing Cognitive Load and Supporting Working Memory
By predicting and completing words and phrases, Lightkey reduces the need to manage spelling, syntax, and sentence construction simultaneously. This supports working memory and allows the student to focus on meaning and organisation.

3. Supporting Writing Fluency and Flow
Real-time predictive support reduces pauses associated with constructing sentences independently, enabling a more continuous writing process and reducing fragmentation in written output.

4. Reducing Anxiety and Frustration
Where anxiety related to numbers, structure, or accuracy impacts writing, Lightkey reduces the need for repeated correction and backspacing. By supporting writing in real time, it helps create a smoother and less disruptive writing experience.

5. Supporting Structured Expression and Clarity
Multi-word and phrase-level predictions provide scaffolded support, helping the student to construct sentences in a more structured and coherent way. This is particularly beneficial where organising written language is challenging.

6. Supporting Processing of Structured or Numerical Information
Lightkey reduces the cognitive demand associated with writing structured or numerical content, enabling the student to integrate this information more effectively into written work.

Additional benefits include:

- **Reduced cognitive load**: supports sequencing and organisation
- **Predictive phrase support**: aids structured writing
- **Reduced need for correction**: supports writing flow and reduces frustration
- **Optional read-aloud functionality**: supports multi-sensory reinforcement
- **Specialist subject dictionaries**: supports academic vocabulary
- **Offline functionality:** ensures data privacy and reliability

Where difficulties present in the organisation, sequencing, and structuring of written composition, alongside increased cognitive load and anxiety related to structured tasks, Lightkey addresses these challenges by supporting the

real-time construction of written language, enabling more coherent, structured, and fluent writing.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with dyscalculia.

Vision Loss

Writing and Reviewing Academic work

The process of written composition can be impacted in terms of visual access, tracking, and fatigue affecting the ability to write, edit and review text effectively. These may include:

- Reduced visual acuity, affecting the ability to read and produce written text
- Difficulties with visual tracking and eye movement, impacting continuous reading and writing
- Increased visual fatigue, particularly during extended writing tasks
- Difficulty navigating complex on-screen layouts, including toolbars, menus, and visual clutter
- Slower reading and writing speed, due to increased visual effort
- Increased cognitive load, where visual effort interferes with the ability to focus on content and meaning

As a result, writing tasks may be tiring, fragmented, and difficult to sustain, with interruptions to both reading and composition processes.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with vision loss, the visual effort required to access and produce text can interfere with this process, making it more difficult to sustain attention to meaning and structure.

Lightkey supports composition by reducing the visual and cognitive demands of writing, enabling greater focus on content. Lightkey is a specialist composition tool designed to support the student during the act of writing, providing real-time predictive text at word and phrase level, enabling the student to construct sentences with reduced visual and cognitive effort.

Standard tools such as Microsoft Word or Google Docs often rely on interaction with toolbars, ribbons, and visual prompts, which can be visually overwhelming and difficult to navigate. This increases visual strain and can interrupt the writing process.

How Lightkey Supports Composition

1. Reducing Visual Clutter and Supporting Accessibility
Lightkey offers a clean, high-contrast workspace with customisable visual settings, allowing the student to adjust text size and contrast. This reduces visual clutter and improves readability, supporting more comfortable writing over extended periods.

2. Supporting Writing with Reduced Visual Tracking Demand
Lightkey predicts words and phrases after only a few keystrokes, reducing the amount of text the student needs to visually track. This is particularly beneficial where eye movement or tracking difficulties impact writing fluency.

3. Reducing Visual Fatigue and Supporting Sustained Writing
By reducing the need for constant reading, correction, and navigation, Lightkey enables a smoother writing process with fewer visual interruptions, supporting sustained engagement.

4. Supporting Writing Fluency with Reduced Need for Visual Correction
Predictive support reduces the need to repeatedly scan and correct text visually, enabling a more continuous composition process and reducing strain.

5. Supporting Use with Assistive Technologies
Lightkey works effectively alongside screen magnifiers, Braille displays, and other vision-related assistive technologies. By reducing typing demand and simplifying interaction, it supports more efficient use of these tools.

Lightkey also includes adaptive functionality designed to optimise the balance between prediction accuracy and usability. Its system processes keystrokes in real time, evaluating context and adjusting the level of predictive support provided. The toggle feature allows the level of prediction to be adjusted, increasing or reducing the number of suggestions displayed. This is particularly relevant for students with vision loss, where excessive on-screen information can increase visual strain and cognitive effort. By optimising the number and relevance of predictions, Lightkey reduces the need for visual scanning and decision-making. This adaptive approach ensures that predictions remain **c**lear, relevant, and manageable, supporting efficient interaction with text while minimising visual overload. As a result, both visual fatigue and cognitive effort are reduced, enabling more accessible and sustained composition.

Lightkey's AI functionality is assistive rather than generative, meaning it supports the student's own writing without producing original content independently. Its predictions are based on the user's own input and adapt over time to reflect their writing patterns and context.

All processing occurs locally on the device, ensuring data privacy and alignment with academic integrity requirements.

Additional benefits include:

- **High-contrast, customisable interface**: improves readability and reduces visual strain
- **Reduced keystrokes**: minimises visual and physical effort
- **Predictive support**: reduces need for constant visual checking
- **Optional read-aloud functionality**: supports auditory reinforcement of text
- **Compatibility with assistive technologies:** supports accessible

workflows
- **Offline functionality**: ensures data privacy and reliability

Where a student's primary difficulty lies in the visual demands of accessing and producing written language, which can significantly impact the composition process, Lightkey addresses these challenges by reducing visual load, cognitive effort, and interaction complexity, enabling more accessible and sustained written expression.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with vision loss.

Hearing Loss

Writing and Reviewing Academic work

Given the student's hearing impairment, this can bring significant challenges associated with the process of written composition, particularly where differences in phonological processing, language acquisition, and translation into written English impact written expression. These may include:

- Difficulties with phonological awareness, affecting spelling and word formation
- Challenges distinguishing similar speech sounds (e.g. /p/ vs /b/, /s/ vs /sh/)
- Difficulties mapping sounds to letters, particularly for unfamiliar or irregular words
- Differences in grammar, syntax, and sentence structure, particularly where language is learned visually
- Increased effort required to construct coherent and grammatically accurate sentences
- Additional cognitive demand when translating ideas into written English, particularly for BSL users
- Increased cognitive load and fatigue, due to continuous language processing and translation

As a result, writing tasks may be effortful, fragmented, and cognitively demanding, particularly where the student must simultaneously manage meaning, structure, and language accuracy.

Lightkey as a specialist composition tool is designed to support the student during the act of writing. It provides real-time predictive text at word and phrase level, enabling the student to construct sentences as they write, supporting grammar, structure, and fluency. Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently produce written language before support is offered. This does not address the underlying challenges associated with forming and structuring written language during composition.

Composition can be defined as the process of forming and organising ideas into coherent written language, including generating content, structuring sentences, selecting vocabulary, and maintaining meaning. For students with hearing loss, difficulties often arise in constructing written language itself, particularly where phonological input is limited or where written English is not the student's primary language system.

Where phonics are impacted, individuals may not hear all the sounds of spoken English clearly enough to distinguish fine differences. This can make it difficult to spell unfamiliar words or those with unpredictable spelling patterns. If specific sounds cannot be perceived, it becomes significantly more difficult to connect them to written letters. Lightkey supports this aspect of composition by reducing reliance on phonological processing and supporting language construction through context and meaning.

Lightkey can offer support where there are difficulties with phonics arising from a hearing loss. Individuals with hearing loss may not hear all the sounds of spoken English or may not hear all of the sounds clearly enough to distinguish fine differences (e.g. /p/ vs /b/ or /s/ vs /sh/). This can make it difficult to spell unfamiliar words or those with unpredictable spelling patterns. Lightkey can help to overcome difficulties with phonics. If a learner cannot perceive specific sounds, it's extremely difficult to connect them to letters when reading or spelling.

Students with hearing impairments may experience difficulties with phonetic-based spelling and grammar, since they often learn language patterns visually rather than aurally. Lightkey offers support in several meaningful ways. Lightkey suggests words and phrases as the student types, based on their writing habits and context - it learns from user input. This helps an individual to write more fluidly without worrying too much about spelling or structure mid-sentence.

Lightkey offers real-time grammar and spelling support with non-intrusive corrections that help students learn correct grammar and word usage. Standard tools such as Microsoft Word or Google Docs primarily provide post-error correction, requiring the student to independently generate text before support is provided. This does not address the underlying difficulties in sequencing, structuring, and organising written language.

For BSL users, English is often a second or additional language.
That means written English proficiency may differ from academic ideas expressed fluently in BSL. When undertaking academic work, BSL users must translate ideas from a visual-spatial grammar (BSL) into linear written English, and follow academic writing conventions (syntax, cohesion, referencing), often without relying on auditory learning or speech-based cues This process can be mentally taxing, not because of ability, but because it involves continuous translation and language switching. Lightkey predicts words and phrases based on context, helping a student to form grammatically correct sentences even if the English structure is not the native language (BSL) order. Lightkey corrects verb tense, articles, and prepositions - common challenges for BSL-to-English translation.

Lightkey bridges visual thinking and written expression. BSL is visual and

spatial, while English is linear. Lightkey reduces typing and helps to quickly find English equivalents for conceptual ideas, focusing on meaning rather than word form, helpful when converting from BSLto English.

Because BSL users may focus visually, Lightkey's colour-coded feedback and live suggestions are easy to follow. Lightkey enables more independent writing and reviewing, reducing reliance on others while improving accuracy and confidence in English output. Lightkey provides visual and non-auditory feedback. Its interface relies entirely on visual feedback, making it naturally accessible for hearing-impaired users. All suggestions, corrections, and cues are visual, color-coded, and context-based, eliminating any reliance on sound cues.

Translating between BSL and English can use significant mental energy. Lightkey's real-time prediction and correction reduce the number of keystrokes and the need to constantly check grammar, freeing focus for critical thinking and academic content. Lightkey can, therefore, improve academic tone and confidence. Academic English often demands specific vocabulary and tone. Lightkey learns your writing style and the language of your subject area, and so over time, it predicts technical or discipline-specific terminology and so writing sounds more formal.

Unlike generic spell checkers, Lightkey adapts to each user's writing style, so it becomes smarter and more supportive over time. Lightkey uses AI to learn from the user's writing patterns, and the application is not intended to override a user's intent. Lightkey is built with user privacy at its core, with all learning taking place locally on the device. The AI works within strict boundaries - learning from user input - it is user centred AI.

Using Lightkey can reduce cognitive load. Since Lightkey predicts whole phrases, students can focus more on content, instead of how to spell or structure it. This is particularly valuable in inclusive classrooms where typing speed and clarity can affect confidence and participation.

Lightkey works offline and doesn't send data to external servers - important for institutes concerned about privacy and accessibility compliance.

How Lightkey Supports Composition

1. Supporting Phonological and Spelling Difficulties
Lightkey provides predictive word and phrase suggestions based on context, reducing reliance on phonetic spelling. This supports students who may not be able to accurately map sounds to letters, enabling more fluent writing without needing to guess spelling.

2. Supporting Sentence Structure and Grammar Development
Students with hearing impairments may learn language patterns visually

rather than aurally, which can affect grammar and syntax. Lightkey provides real-time, context-aware suggestions that support correct sentence structure, including verb tense, articles, and prepositions.

3. Supporting Translation into Written English (BSL Users)
For students who use British Sign Language (BSL), written English is often a second or additional language. This requires translation from a visual-spatial language into linear written form, which can be cognitively demanding.

Lightkey supports this process by:

- Predicting words and phrases based on context
- Supporting grammatically correct sentence formation
- Helping align written English structure with academic conventions
- Assisting with translating conceptual ideas into appropriate written language

This reduces the cognitive load associated with continuous language switching and supports more fluent written expression.

4. Supporting Writing Fluency and Reducing Cognitive Load
By predicting whole words and phrases, Lightkey reduces the need to focus on spelling and structure simultaneously. This allows the student to focus on meaning and content, supporting more continuous and fluent composition.

5. Supporting Visual Language Processing
Lightkey provides entirely visual, non-auditory feedback, including colour-coded suggestions and contextual prompts. This aligns well with visual learning styles and ensures accessibility without reliance on sound.

6. Supporting Confidence and Independence in Writing
By reducing reliance on external correction and supporting writing in real time, Lightkey enables more independent writing. Its adaptive learning ensures that suggestions become more personalised over time, supporting consistent phrasing and improved academic tone.

Lightkey's AI functionality is assistive rather than generative, meaning it supports the student's own writing without producing original content independently. It learns from the user's writing patterns and adapts over time, supporting personalisation and consistency. All processing occurs locally on the device, ensuring data privacy and alignment with academic integrity requirements. This user-centred approach ensures that the technology enhances, rather than replaces, the student's authorship.

Additional benefits include:

- **Visual, non-auditory interface**: fully accessible for hearing-impaired users
- **Predictive phrase support**: aids grammar, structure, and fluency
- **Reduced cognitive load** : supports language processing and

translation
- **Colour-coded visual feedback**: supports clarity and ease of use
- **Optional read-aloud functionality**: supports reinforcement where appropriate
- **Specialist subject dictionaries**: supports academic vocabulary and tone
- **Offline functionality**: ensures data privacy and compliance

Where the primary difficulty lies in the construction and translation of written language, particularly where phonological processing, grammar, and language structure are affected, Lightkey addresses these challenges by supporting the real-time composition of written language, reducing reliance on phonics, supporting translation into written English, and enabling more fluent, accurate, and confident writing.

As such, Lightkey represents a targeted, disability-specific intervention, appropriate to support academic writing for students with hearing loss.

Summary

Across all identified disability profiles, the primary barrier is not limited to spelling and grammar accuracy, but lies within the broader process of written composition. Composition involves the ability to generate ideas, structure sentences, organise thoughts, select appropriate vocabulary, and maintain coherence while writing.

For many students, difficulties arise during this process, where multiple cognitive, linguistic, physical, or sensory demands must be managed simultaneously. These may include challenges with working memory, processing speed, attention, sequencing, motor coordination, language formulation, visual access, or the translation of ideas into written English. As a result, writing can become fragmented, effortful, and difficult to sustain. While standard tools such as Microsoft Word or Google Docs provide support at the point of error correction, they do not address these real-time barriers within the act of writing itself.

Lightkey is therefore appropriately categorised as a composition tool, as it supports the formation of written language in real time, rather than simply correcting errors after text has been produced. Through predictive word and phrase suggestions, adaptive learning, and context-aware support, Lightkey enables students to construct sentences, maintain writing flow, and organise ideas more effectively during composition.

This functionality reduces cognitive load, supports working memory, improves fluency, and enables sustained engagement with writing tasks. It also reduces physical effort, visual strain, and language-processing demands where relevant, ensuring accessibility across a wide range of disability types.

Importantly, Lightkey's AI functionality is assistive rather than generative, meaning it supports the student's own authorship without producing original content independently. All processing occurs locally on the device, ensuring privacy and alignment with academic integrity requirements. While there may be limited overlap in features with other tools (e.g. spelling and grammar correction or planning/mind mapping tools), these operate at different stages of the writing process. Lightkey uniquely supports the core stage of composition, where many students experience the greatest difficulty.

As such, Lightkey represents a specialist, disability-focused intervention, appropriate for recommendation where there is a clear need to support the process of written composition. It should not be considered equivalent to

standard spelling and grammar tools, as it addresses a distinct and critical aspect of academic writing.

Lightkey supports not just what students write, but how they are able to write, thereby addressing the fundamental barriers to written composition experienced across a range of disability profiles.