

Mobile Phone strategies to support Learning  
for Students with Disabilities

“The 99 tools from the magical pocket of Aki-chan”



Magical Pocket of Aki-chan Project

# Mobile Phone strategies to support Learning for Students with Disabilities

## “The 99 tools from the magical pocket of Aki-chan”

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The project name represents the mobile phone as a ‘magical pocket’ filled with tools – each time you go into the pocket you can pull out a strategy that may help support the learning and participation in the classroom, of a student with disabilities. The aim of the project is to conduct research as well as raise awareness of the use of the mobile phone to support the independence of these students in their daily lives.

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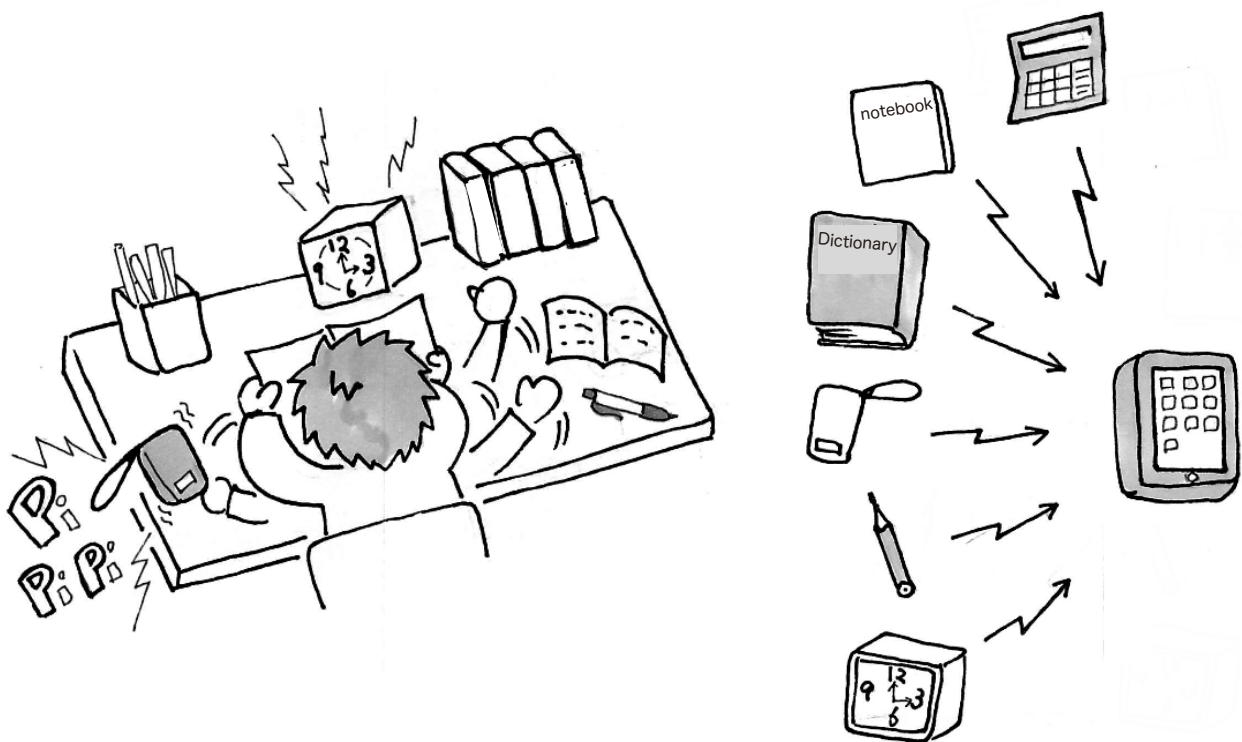
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# Introduction

Over recent years the mobile phone has been considered to be disruptive and even detrimental for students attending school. The distractions of exchanging emails and possible harmful information taken from the internet are not necessarily welcomed in the classroom.

This booklet aims to dispel this notion without judging whether the mobile phone is or is not a distraction in the class, but rather to introduce the idea that many of the mobile phone features can be beneficial to learning and enhance the wellbeing of students with disabilities.



Reading, writing, keeping and making notes, understanding time, planning activities, listening, calculating and using a dictionary, surfing the web, calling and messaging friends can all be undertaken on a mobile phone using tools from the 'magical pocket'

# Why use a Mobile Phone for Education

## Mobile Phone as a Magical Device

Although the mobile phone is a phone just like a 'land line' phone in a home, in that it is possible to call friends and family, it has developed into a tool that adapts to any lifestyle. It offers the chance to organise appointments, surf the web, calculate sums, check the time, take photographs, search in a dictionary, make an audio recording and use electronic money. Applications can be added that may allow for other activities, such as checking a school timetable or writing homework exercises for class. The tools needed for many activities in class are often spread out on a desktop. Now they can be found in one device. Students tend to be highly motivated to use mobile phones at all times, so why don't we encourage them to use them for learning?

The cost of having many items normally used for learning could be reduced, as now they are available in a single device.

## Anytime and Anywhere

In the past studying took place in the classroom, library and at home, but now the mobile phone can be used in most locations – on the train, waiting for a bus and in a friend's house – learning can take place anytime and anywhere. The mobile phone is eminently portable. However, in the past the screens were small with poor resolution but now the screens are larger, text is clearer, one can read books and newspapers, write more, plus the accessibility options are improving. The mobile phone has become a useful multifunctional tool to help throughout the day wherever you are.

## Communication

The phone used to be a long distance oral communication tool, but email has taken over much of this function. Oral communication tends to be costly especially when used from one part of the world to another. The time of day matters and you may not always be in the right place. Mobile messaging is cheaper, can be read at any time and takes place from most locations. The advantages of email and messaging for those with speech and hearing difficulties make the mobile phone a device that offers the freedom to communicate independently.

## Mobile Phone Literacy

Students of the 21st century are happy to use the mobile phone having been brought up with the device since birth. They understand the wide range of features and even if studying is a struggle using the mobile phone is usually not a problem. The mobile phone has become part of their everyday life, used whenever there is a free moment. The enjoyment gained from using the mobile phone makes it an ideal device to which it is possible to add interesting teaching materials without the students realising they are learning away from the classroom.

## Students for whom the use of a mobile phone offers opportunities for independence

There are many areas in which the mobile phone can help students with disabilities but the three main ones for consideration are: learning, communication and management skills.

There may be built-in accessibility options – ‘device accessibility’ that offer students with disabilities the chance to use a mobile phone. However, this booklet is about how the mobile phone can offer access to strategies for students with disabilities to be able to participate in both learning and social activities – ‘activity accessibility’ .



### Optional Services

These may be additional services that may not be included with the mobile phone, but are part of the service provider options such as access to the internet.



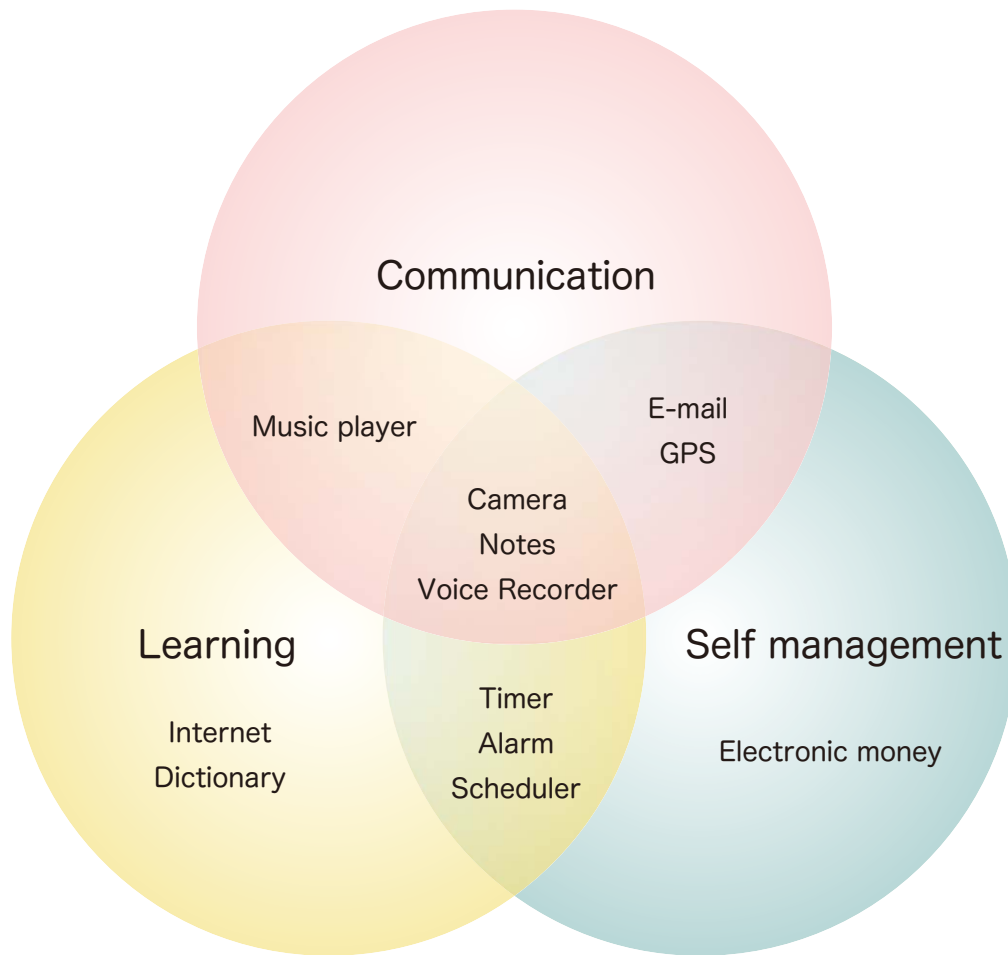
### Activity Accessibility

This concept is the link between activities that use the features built into the mobile phone such as e-mail, audio memo, note, camera, audio player, call/speaker phone, GPS, electronic money and the accessible strategies used by the students with disabilities. \*The pie chart shows the relationship between Learning, Communication and Management Skills and the built-in features.



### Device Accessibility

There are several features that offer easier access to the mobile phone such as keyboard use, prediction or word finishing, handwriting and speech recognition, vibration text to speech, contrast levels, magnification and different font sizes.



## Matrix of features found on mobile phones and their usage by students with

The matrix seen in the following pages shows how students with disabilities can make use of the many features found on mobile phones to participate in the classroom and their daily lives. The matrix should be used as a springboard for discussion and is not a finite list of strategies; it is there to provide ideas and stimulate innovative thinking in the use of this popular technology.

The features of the mobile phone can be found along the top of the matrix and the label for each disability down the left-hand side. Following across the matrix are cells containing some of the suggested strategies relevant to each feature and disability. Each cell also contains a symbol (letter) that represents each area: C for Communication, L for Learning and M for Management Skills.

The numbers seen on the third line down from the top of the matrix represent page numbers linked to further explanations about the use of the features listed and also case studies for the strategies found in the pale orange coloured cells.

Feature	E-mail			Camera				Memo Recorder			
Usage	Communication with others	Alternative for handwriting	Asynchronous/time to support proof reading & comprehension	Communication with others	Alternative for handwriting	Memory Aid	Alternative for Viewing	Communication with others	Alternative for handwriting	Memory Aid	Alternative for Viewing
Page numbers	9	9	9	10	11	14	—	10	11	14	—
Intellectual Disabilities/ Autism with Intellectual Disabilities	Written messages can be used as an alternative to spoken messages C		Provides time to read and understand. C	Pictures can be used as an alternative to spoken messages and to help understanding C	Pictures acts as a substitute for written information and handwriting L M			Recorded memos by others used for communication C	Record your own memos instead of using handwriting. L M	Record your own memos to aid recall M	
High Functioning Autism/ Asperger's Syndrome	Written messages can be used as an alternative to spoken messages C			Pictures can be used as an alternative to spoken messages and to help understanding C				Recorded memos by others used for communication C	Record your own memos instead of using handwriting L M		Keep an audio memo to allow others to help with explanations L M
Dyslexia/ Dysgraphia		Typing/Word Prediction can be used as an alternative to handwriting C			Pictures acts as a substitute for written information and handwriting L M		Record your own memos to aid recall M		Record your own memos instead of using handwriting L M	Record your own memos to aid recall M	
ADHD			Provides time to concentrate and proofread content. C			Pictures acts as a substitute for handwriting L M				Record your own memos to aid recall M	
Motor/ Dexterity Difficulties		Typing/Word Prediction can be used as an alternative to handwriting C			Pictures acts as a substitute for handwriting L M				Record your own memos instead of using handwriting L M		
Hearing	Written messages can be used as an alternative to spoken messages C			Pictures can be used as an alternative to spoken messages and help explain a situation C							Keep an audio memo to allow others to help with explanations L M
Speech	Written messages can be used as an alternative to spoken messages C			Pictures can be used as an alternative to spoken messages and help explain a situation C				Recorded memos by others used for communication C			
Sight		Typing/Word Prediction can be used as an alternative to handwriting with screen reading C					Capture pictures to show others when eyesight is poor and an explanation is needed L M		Record your own memos instead of using handwriting. L M		
Memory			Chance to re-read and go back to old messages as a memory aid. C						Record your own memos to keep a record. L M	Record your own memos to aid recall M	



Notes			Internet search /Dictionary	Time/Calendar/Reminder/Alarm		Audio		Calls /speaker phone	GPS	Digital Money
Communication with others	Alternative for handwriting	Memory Aid & comprehension	Finding information and vocabular	Organisation/ Time Management	Understanding Time	Communication with others	Alternative for Reading	Communication with others	Location	Electronic money
9	11	—	—	15	13	—	12	—	16	—
Exchanging written notes as an alternative to spokenn messages C			Immediate search available for ideas and words. L	Activities stored in the calendar act as reminders. L M	Help to understand time and its consequences L M	Music and melody can be used to give a cue to action C		Can be used with a carer to explain a situation. C		Helps with money calculations / provides history of money spent. M
Exchanging written notes as an alternative to spokenn messages C				Activities stored in the calendar act as reminders. L M	Help to understand time and its consequences. L M	Music and melody can be used to give a cue to action C				
	Typing/Word Prediction can be used as an alternative to handwriting C L M		Immediate search available for ideas and words. L	Activities stored in the calendar act as reminders. L M			Listen to recorded readings to help understanding. L			
				Calendar reminders help to manage distractions. L M	Helps with the concept of time on task L M				Keep records of places visited and use later with photos from camera M	Provides history of money spent to be checked later. M
	Typing/Word Prediction can be used as an alternative to handwriting C L M	Easy to search electronic notes rather than turn pages. L M	Electronic search available for ideas and words easier than turning pages. L				Listen to recorded readings as difficulty turning pages L	Can be used hands free if dexterity is a problem. C	Use maps to send information to others when out and about. C M	Helps with the problems of handling coins and paper money. M
Exchanging written notes as an alternative to spokenn messages C			Supports vocabulary when reading. C L M	Vibration function as an alert with calendar reminders. L M				Use speaker phone with other hearing person C		
Exchanging written notes as an alternative to spokenn messages C								Use speaker phone with other person C		
	Typing/Word Prediction can be used as an alternative to handwriting with screen reading C L M	Easy to search electronic notes with screen reader software. L M		Calendar activities can be used with screen reader. L M			Listen to recorded readings to help understanding when visually impaired. L	Use handsfree if wishing to type notes/Braille C M	If camera/ email and GPS location are linked can send information to others C M	Helps with the problems of handling coins and paper money. M
		Easy to browse list of electronic notes. L M		Reminders of calendar activities helps time management. L M					Keep records of places visited and use later with photos from camera M	

Feature	Text to speech		Magnification / Text enlargement	Contrast levels	Prediction	Handwriting recognition	Speech Recognition	Vibration
Usage	Communication with others	Alternative for Reading	Visual Aid	Visual Aid	Alternative for Writing	Alternative for Typing	Alternative for Writing	Notifying Alert
Page numbers	—	12	—	—	11	11	—	—
Intellectual Disabilities/ Autism with Intellectual Disabilities	Communication with others / used as speech aid from text message. C	Helps to make written text more understandable both for notes and web. L			Helps with slow typing and vocabulary skills C L M	Useful if handwritten message can be recognised and read back with text to speech C L M		Alerts the user when sounds alone are insufficient. M
High Functioning Autism/ Asperger's Syndrome	Communication with others / used as speech aid from text message. C				Helps with typing skills C L M			Alerts the user when sounds alone are insufficient. M
Dyslexia/ Dysgraphia		Helps to make written text more understandable both for notes and web. L	Helps with reading sometimes to increase font sizes. C L M	Different contrast levels may help reading including changes to background colours. C L M		Useful if handwritten message can be recognised and read back with text to speech C L M	Voice command and dictation avoids the need to write/type. C L M	
ADHD								Alerts the user when sounds alone are insufficient. M
Motor/ Dexterity Difficulties		Listen to text to speech as difficulty turning pages, used for notes and web. L			Helps with slow typing rather than using handwriting C L M		Hands free voice command and dictation C L M	
Hearing						May be easier for messages C L M		Alerts the user when sounds such as ring tones cannot be heard. C M
Speech	Communication with others / used as speech aid from text message. C							
Sight		Screen reading for all textual information, notes and web. L	Magnification helps those with low vision. C L M	High contrast may help reading with changes in background and text colours C L M	Can be used with screen reader C L M		Useful as an addition to the ring tone. M	Useful as an addition to the ring tone. M
Memory								

## Students with Oral Communication Difficulties

### Text based messaging can make communication interactive



In the classroom students with communication difficulties such as those with speech impairments, autism, hearing impairment may be left out of the discussions, as they are unable to interact with speed and clarity. They cannot join with their peers in gaining the teacher's attention or expressing their views.



### Usage

E-mail and short messages are often considered in a negative light in the classroom, due to the distractions caused, but for students with communication difficulties they may be extremely helpful. It may allow them to communicate with those around them and add clarity and speed to their interactions with peers. These features can broaden and enhance their communication skills with a wider audience.

Notes on the mobile phone can be used by those who have hearing and speech impairments to communicate with others. These notes can take the place of handwritten jottings, be saved and re-read at a later date and even e-mailed to confirm what has been said.

### Case Studies

Mari has polio and a speech impairment that makes it hard for her to speak clearly. Her articulation is poor and she has paralysis in both her arms and legs. She is unable to hold a pen or handwrite clearly, but she is able to use the keys on a mobile phone. Whenever she wants to communicate with her classmates and teacher she uses the notes application on her phone.

Ken has high functioning autism and is good at reading and understanding text, but he finds oral communication difficult and it is hard for him to keep up with conversations. He tends to speak softly so does not easily engage with group work. However, he is an active participant in email exchanges with both teachers and his peers, especially when the subject is video games!

### The audio recorder and camera as a communication aid



Students who have a language difficulty tend to find it hard to communicate with others as their vocabulary maybe poor. They need the motivation to communicate and the camera and audio recorder can be used as tools to develop discussions and explanations that may not be easy with words alone.



#### Usage

Audio Recorders can usually be found on most mobile phones. However, these tend to be used for just keeping short audio notes but they can be used for exchanging conversations with others. The students who have language difficulties may use them to prepare a message before a meeting or allow a carer to translate their feelings into an audio message that can be used at a later date. By experiencing these exchanges in conversation some students may learn the importance of dialogue and understand the process over time. Enjoyment can be gained from communicating with others and the use of audio recordings may enhance their chance to join with their peers in regular daily communication.

Cameras are also found on many smart phones and can be used as a method for showing and telling others about feelings and needs. It can complement spoken language and provide a way into a conversation.

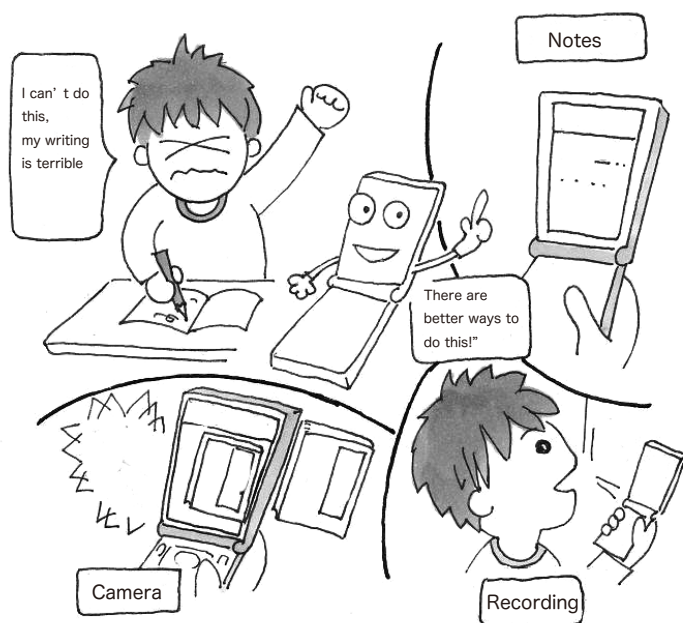
#### Case Studies

Jun has high functioning autism and is unable to enjoy daily conversations; he finds it hard to say what he wants for lunch and even the basic greetings of the day cause problems. He uses the recorder on his mobile to say 'Good morning' and even to ask for his favourite meal – noodles in a restaurant. When the waitress comes he is able to play the message and when the right meal arrives he is extremely happy!

Ryo has an intellectual disability and finds it hard to express his needs using oral language, even asking for basic needs are a challenge, such as going to the toilet. Ryo has taken a picture of the toilet on his phone to show to others at times during the day. At other times when he is shown this picture in another location he is able to understand the concept.

## Students with Writing Difficulties

### Where handwriting is difficult alternatives are on offer



There are many reasons for students to find it hard to handwrite for instance motor and dexterity difficulties, dyslexia/dysgraphia, intellectual disabilities, autism and visual impairment. The alternatives to handwriting may be through taking memos on the mobile phone via typing, speech, camera and audio recorder.



### Usage

Audio recording, notes and camera features are found on most mobile phones and can be used to engage students in activities that would normally be associated with handwriting. Typed notes, audio memos and pictures can support written communication. For those with motor and intellectual difficulties there may be problems with using a pen, but there may also be difficulties with vocabulary as well as structuring written language. For those with visual impairments handwriting is an issue, but keeping notes via the audio recorder using typed notes with a screen reader or magnification can assist with remembering and communicating ideas for daily life in the learning environment or even socially.

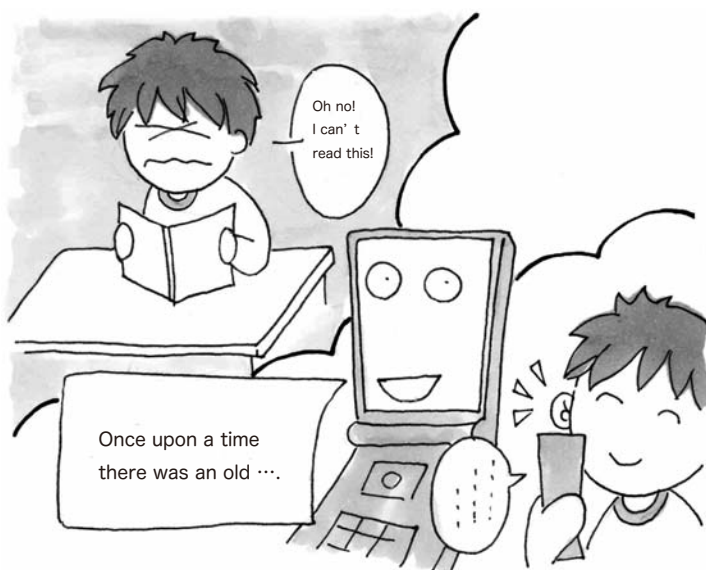
### Case Studies

Yuri has both dyslexia and dysgraphia. She finds it hard to take handwritten notes from teachers about her school timetable or homework. She often forgets what is needed so she uses the audio recorder to capture the instructions and then re-listens to the message the next day to make sure she has all that is needed for her classwork.

Takeshi has a motor disability and due to his dexterity difficulty he has never taken handwritten notes. He often forgets appointments and tasks that he needs to complete. The people around him used to keep encouraging him to take notes. This was difficult for Takeshi, until he decided that the one way he could work in a similar way to his peers was to use the audio recorder and camera for all his memos, appointments and a way to remember what he needed to do.

## Students who have Reading Difficulties

### Reading by listening with the screen reader or audio player



Students with dyslexia (reading and understanding the words), visual impairment (seeing the words), motor difficulties (turning the pages) all find it hard to cope with paper based text. However, they may be able to manage digital text using text to speech, screen readers or listen to audio recorded texts. Reading by listening may be crucial for their literacy skills.



### Usage

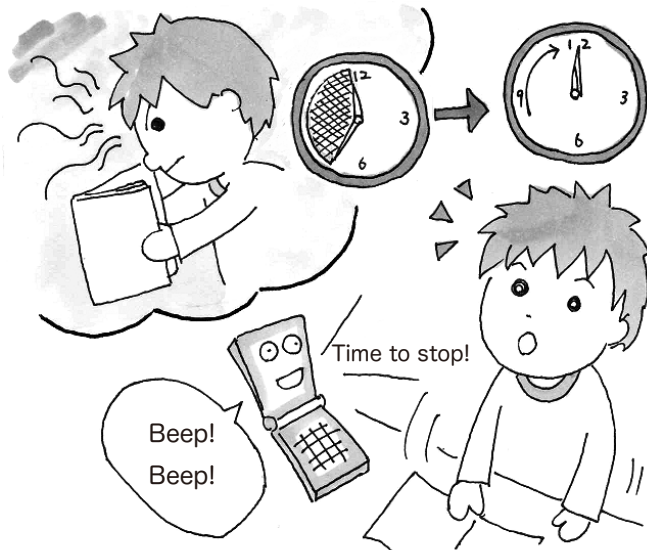
Screen reader and text to speech features allow the user to hear text read out from the screen of the mobile phone. A screen reader will read all the menus and navigational features but text to speech tends to just read the content of an e-book or note. When text is read aloud using speech synthesis the child can be independent and listen to their emails, notes and other text items on their mobile phone without having to ask for help.

The Audio player function not only allows the child to listen to music but can also be used for digital talking books with real speech or those books or worksheets that have been recorded into an MP3 player using speech synthesis.

### Case Studies

Ko has both dyslexia and dysgraphia. He can understand text by listening but finds it hard to cope with words on a page. During his classes there are times when everyone is reading and he just pretends. Recently he has used an MP3 file to listen to the story before coming to school. Now he can enjoy the story with his peers. The story may have been recorded on the phone by the teacher or family member and so he has real speech on his file. But this is time consuming, so the text can also be scanned and then saved by using software on his computer that adds speech synthesis to produce a talking digital book. The saved Mp3 file is then downloaded onto the mobile phone for listening to at any time.

## Time Management and Timekeeping tools



Students with Autism have difficulties appreciating how time passes but those with Attention Deficit Hyperactive Disorder (ADHD) or Attention Deficit Disorder (ADD) tend to become distracted and often fail to pay attention to time. Using devices that offer support for these difficulties may provide more realistic strategies than attempting to teach time in isolation.



### Usage

The Timer (that shows periods of work) and the alarm (that alerts the child to a set time) both play an important role in learning time management. The ADHD/ADD child with attention difficulties may need to be reminded when time is passing to concentrate on work. The child with Autism will need to understand the concept of time and they may need to change to another activity. By using either the timer or alarm the students can be more relaxed about concerns related to time and can adapt better to group activities without panicking.

Some new smart phones have more features that can show visually how much time is left to complete a task for example the iPhone.

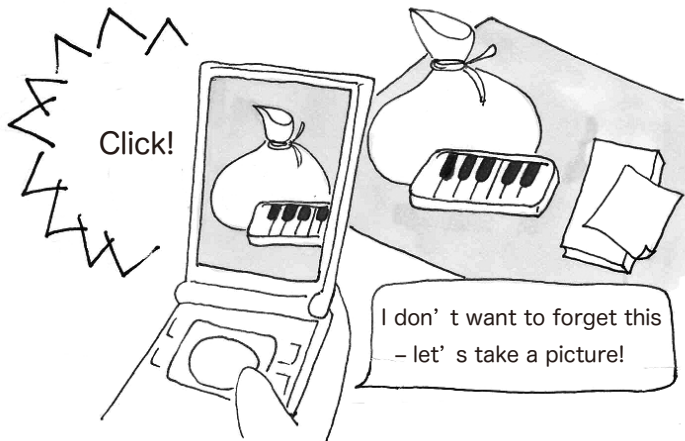
### Case Studies

Satomi has ADHD and has some very repetitive and restricted behaviour that means once she has started a new task she will remain focussed on this activity for too long. There are times when she becomes overtired and is unable to attend school. Satomi uses the alarm function on the phone to make her take a break after a certain length of time. This has made her feel better and less tired.

Kenji has Autism and finds the concept of time hard to understand. His teacher may suggest that there is a play period for 30 minutes but when this time has elapsed Kenji feels as if it has only just started. He becomes panicky because he feels the teacher has suddenly stopped playing with him. The timer provides a visual representation of how the time passes, so he can see how long he can continue playing. This has reduced his levels of stress and he no longer feels as panicky.

## Students with Memory Difficulties

### Reminders to help the problem of forgetfulness



Students can lose their confidence if they have memory difficulties. If they have ADHD/ADD they may be distracted, so often miss or forget things or tasks that need to be done. Rather than pointing out what has been missed, it is important to teach students how to check what has been forgotten.



### Usage

The Camera, when included as a mobile phone feature, is very popular. It is easy to use and captures clear images that can be stored and used in many ways. It can become very important as a recording tool for students with memory difficulties and ADHD/ADD, providing a story board to jog the memory. The stream of pictures can be reviewed and act as constant reminders.

### Case Studies

Shin has a memory disorder and finds it hard to remember where he has been and what he may have done and with whom. If he takes pictures with the mobile phone, the camera makes a date and time stamp of all his activities. One day Shin went to the vineyard to pick some grapes and he completely forgot about this activity, but he was able to see the pictures at a later date to jog his memory. The camera function has become an immensely important tool in his life to help him remember past happenings.

Hana has ADHD and finds that even if she wants to pay attention to something, she is easily distracted and this will make her forget what she is doing or what she may need to take with her. She often leaves behind items needed in school and is told off by her teachers. Now she is using the camera in her phone to take pictures of what is required to act as a reminder. She is able to compare the list of pictures with what she has in her bag to make sure nothing is forgotten.



## Students with Organisational Difficulties

### Reminders to help with organisation



There are many different disorders that cause organisational difficulties such as memory, intellectual disabilities and ADHD/ADD. Note taking may be possible but the notes may never be looked at again as they may be forgotten. Reminders on the mobile phone can be used instead of others having to tell the child what has been missed.



### Usage

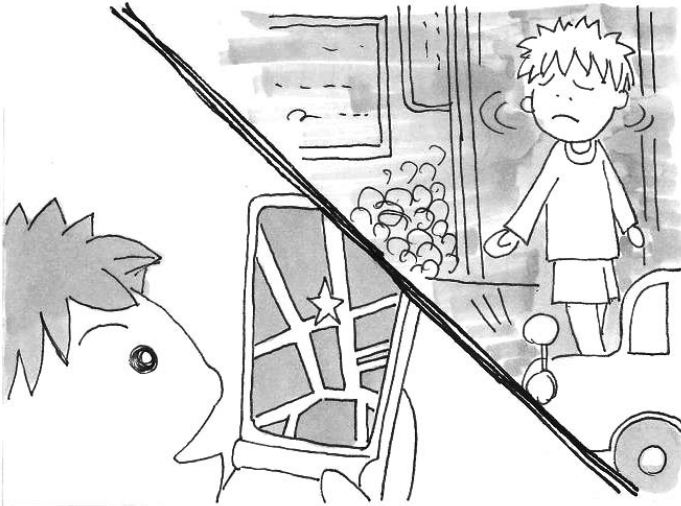
Calendars usually have alarms that can be set before an activity to act as a reminder. It may be hard for those with intellectual disabilities, ADHD/ADD or memory difficulties to remember all their activities and they may become stressed when their peers change to another task. The reminder on the calendar can reassure them and prevent the feeling of panic and tell them what they should be doing.

It may not be the actual calendar on the mobile phone that alerts the user. It is possible to set up web services such as Google Calendar, Yahoo! or Windows Live Calendar to send an email or SMS reminder to alert the child to a change in activity. It is also possible for others to set up a timetable and provide reminders without having to use the child's mobile phone. The phone automatically picks up these reminders.

### Case Studies

Kouji has a minimal intellectual difficulty which makes it hard for him to prepare for a day at school and understand any changes in the timetable. There are times when he feels so confused and panics so that he is unable to attend school. Now he checks the timetable for the next day on the school website where his teacher can make any necessary changes to his lessons. The changes are also sent to his mobile phone via email which allows him to relax and check what he is doing the following morning. The teacher is only making one change on the web, but this change is being sent out to all students, so helps all those with similar difficulties as well as the parents and students who may have no disabilities.

### GPS to show the location to both the user and their carer



GPS is not solely for parents who wish to see where their students are, but also for those with visual impairments and motor difficulties. The visually impaired child may have problems providing an accurate description of their location and destination whereas those with motor difficulties may be unable to reach their destination and a need to direct another person to their present location and then give advice about where they wish to go.



### Usage

Global Positioning Systems (GPS) may be available on some mobile phones and this feature can show the present location of the user. It is usually combined with a map application so that the location can be sent via email to others. The camera may also have a GPS feature so that when a photograph is taken the precise location can be captured and sent to another person.

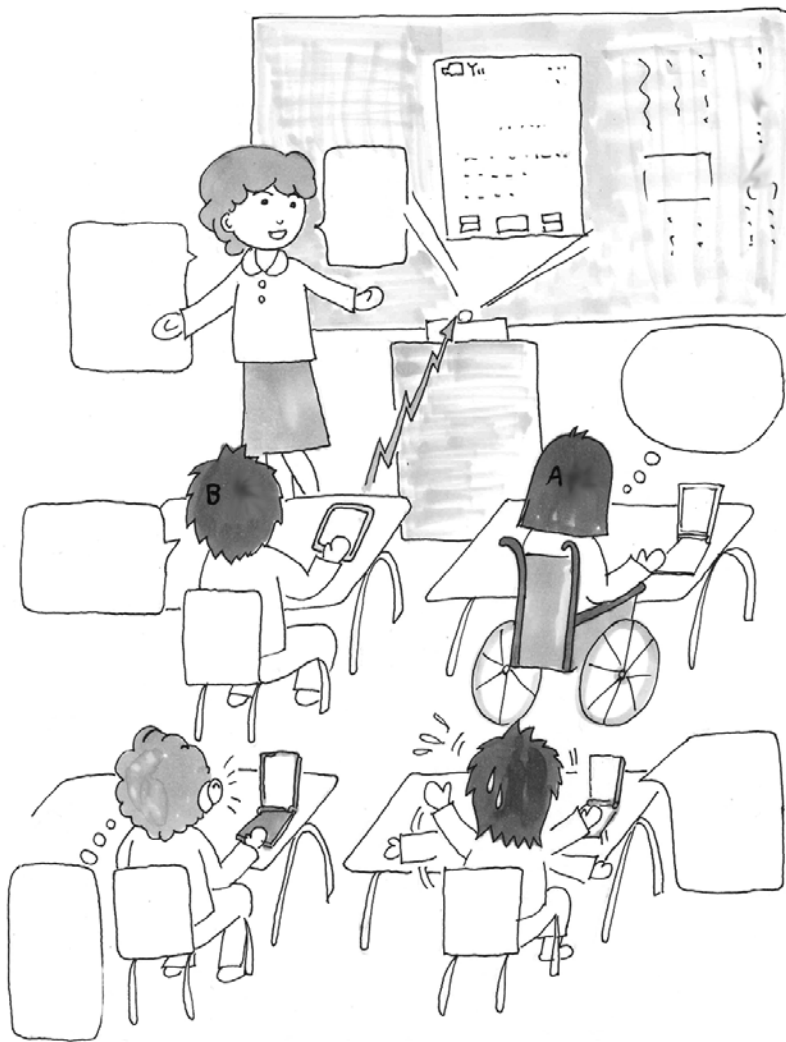
Some parents use GPS to keep an eye on where their students are going, so that they can be assured of their safety. However, this is only one use, as it is possible for students with visual or motor impairment to use the system themselves to tell others about their location. Students with memory difficulties can store the pictures of each location, as a way of reminding them about where they have been.

The GPS feature can offer independence and be used in many ways depending on the difficulties encountered by the child. (It should be noted that it may be necessary to have an internet based service in order to update the maps.)

### Case Studies

Mayumi has a visual impairment and when she going into town to see friends she finds it hard to use the landmarks to find her way. There are times when she gets lost and when there is no one to give her directions or when she needs to meet up at a particular place. Now, she uses the GPS feature to find her way or to send an email to a friend to ask for help. This has given her confidence and peace of mind to cope independently with much of her wayfinding.

# Classroom of the Future



Picture and bubbles starting from teacher

Teacher asking Ben “Ben, can you show me your story?”

B says – “I am going to send it to the white board.” - story shown on whiteboard

Teacher asking Alice “Alice do you understand all the words that Ben has used?”

Alice is thinking –“I am not sure, I think I will use my online dictionary - it is so much easier to use compared to my pocket dictionary where I can’t turn the pages.”

Another student who is deaf is thinking – “I can check what the teacher is saying using automatic speech recognition which will transcribe all that she says and turn it into text.”

Another student who has ADHD is thinking – “Lets record what is being said as I know I will forget this lesson if I do not concentrate or make notes.”

The role of the mobile phone could become an important factor in allowing the classroom of the future to not only be inclusive but also encourage accessible learning strategies for all.