# Recording and Monitoring Attendance:

## An electronic solution using QR Codes where large numbers of students are present.



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# Part 1:
# 1. Introduction and Background

The University policy on Recording and Monitoring Attendance states in point 2.2 that,

> *"The attendance of all taught students must be recorded by the registering School.   Attendance points must be recorded **weekly, throughout each semester**." (TLSO, 2014)*

At present, student attendances in the School are largely gathered using paper-based methods, using signing-in sheets, that students have to sign.  Attendance data generated by this method takes time to process and make available to others.  Collecting this information is a time-consuming task when you consider there are approximately 60 UG and PG course units running across the School per Semester.  According to University policy, this has to be done on a regular basis, '*weekly*' and where several '*trigger points*' need to be recorded to check that students are complying with University code of conduct.

This paper considers an electronic solution to gathering and reporting of student attendances, especially with large groups of upwards of 350 students which are quite common in the School.

The current method for taking attendances in the School of MACE relies primarily on pre-prepared, printed-out lists that require a student to place their signature on the sheet alongside their name to record their attendance.  For large groups of over 300 students, this is an onerous task, only compounded when students arrive late, through multiple entrances, who then forget to sign-in, sign in the wrong place, sign twice, sign for someone else etc.

The accuracy of paper-based registers that are passed around a room for students to complete has to be questionable.  The completed list of assumed attendees then requires secondary processing by a Programme Administrator who then have to enter the attendance data into an spreadsheet before re-distribution to course team leaders.

In Semester two 2013-14, I was asked to help out with recording the attendance of a group of 326 students on Professor Andrew Gibson's Electrical Energy and Circuits first year unit, MACE10492.   To record the names of attendees each week, three colour-coded lists were produced, one each for Aerospace (yellow), Mechanical (green) and Civil Engineering (blue) students.   Three copies of each list were then copied and a clipboard provided making a total of nine clipboards (and pens) to be carried to each session.

**Figure 1:** The 1st Year MACE 10492 group and the clipboards set out at the back of the room. This was repeated for all twelve lectures that ran in Simon Building in Semester 2, 2013-14).

The lecture was scheduled to start at 3:00pm and I arrived at the lecture room 15-20 minutes before with the lecturer. For the first session, I handed out the clipboards to students, in the hope they would sign them and then pass them on. The majority of students signed but they had to search through three pages of the relevant list to find name. (Mech students had the longest search with over 180 names to look through) This method worked but took time for students to complete and the lists were still going round during the lecture. This 'distributed approach' led to one clipboard going missing. *(It was returned to the tutor at the end of the session who later passed it on to me.)* Some students also thought it fun to write amusing names and doodle on the sheets.

I altered my approach in week two and laid out the clipboards (**as figure 1**) and located them near the (single) entrance to the lecture room and stood by the entrance to greet students and ask them to sign in on arrival. This improved the process but caused bottlenecks when large numbers of around 20 students arrived together all wanting to sign in. Some students, despite politely asking them to sign in, ignored me and sat down without signing.

Gradually over the remaining weeks, students became more accustomed to the routine and most students signed in before taking their seats. I remained at the back of the room once the lecture had started at 3:00 and stayed for another 30 minutes to grab any latecomers arriving. At 3:30 I collected the clipboards and put them in a carrier bag. I then took the bag back to George Begg building and returned the clipboards to the three Undergraduate Programme Administrators. The Programme Administrators then entered the attendances onto a separate spreadsheet they each kept to record the attendance.

This whole approach was a time-consuming and labour-intensive process, that involved the efforts of a number of staff and took up several staff-hours each week to process just this one group. Scaled up across the School, the processing of attendance data using this manual approach must take many hours of staff time every week.

## 1.1  A Paperless Electronic System

This paper considers an alternative approach.

Following my experience with the MACE 10492 group I drew up some features of what an alternative system would ideally require.

- A system that would support the University policy and its requirements for attendance monitoring and recording,
- a system that would be robust, portable and simple for staff to use,
- a system that would eliminate the need for paper-based lists and the re-entering of attendance data from paper-lists to spreadsheets,
- a system where attendances could be quickly captured and recorded on entry,
- a system that would be flexible, scalable and used by either small groups or for large lecture classes,
- a system that would be reliable and accurately record those present or absent.

Over the summer (2014) I considered several approaches to the problem.  I thought about using touch-screen tablets with spreadsheet lists of students, biometric systems such as the  capture and measurement of student fingerprints that could be used with a portable fingerprint scanner.  I looked at using wireless voting systems where the students could register their attendance from their own mobile phones using a wireless based voting system (mBclick).

I ruled many of these systems out as they either needed a good Wi-Fi service (mbClick) or required expensive hardware and installation costs (biometric analysis). An alternative system should avoid these.

## 1.2  Using Blackboard to record attendance

A new system would need access to student data to create digital class registers. Although Campus Solutions has this data, I wanted a source that teaching staff have access to.   Via the Grade Centre in Blackboard staff can access access student data such as; last name, first name, ID number, IT username and their University email address.

The first consideration was to create additional columns in the Blackboard Grade centre, export this to a spreadsheet app on an iPad, and then enter the weekly attendances against the student names before importing this updated information back into the Grade centre.  This approach worked, but it took time to enter the data and the Grade centre soon began to look un-wieldy for large group sizes with over 300 rows.

## 1.3 Replacing Paper with an iPad

I considered replacing the clipboards with an iPad and an app which could hopefully import data from Blackboard's Grade Centre. I searched the iTunes App Store on 'Attendance' for apps that handled attendance which returned a number of options shown in figure 2.



**Figure 2:** iTunes returned a number of potential apps.

I downloaded the first four (free) apps in figure 2 but soon discounted these, though the Stearsoft app shown in figure 3, looked useful and had been developed for use in schools and further education colleges.
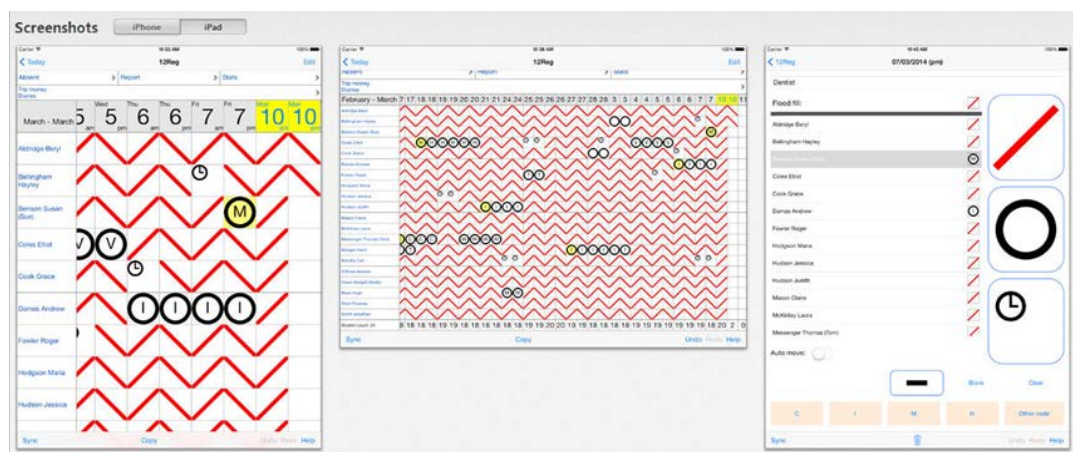


**Figure 3**: Stearsoft's attendance app.

The Stearsoft app was good but the free 'lite' version only allowed a test with up to 40 students. There were on-costs to consider for the full version so I went no further.

The next app on my list to evaluate was, *Attendance*.
The publicity information for *Attendance* said that the developer had built the app initially for use with **Blackboard** which sounded useful**,** so I paid **£2.99** for the app and downloaded it.
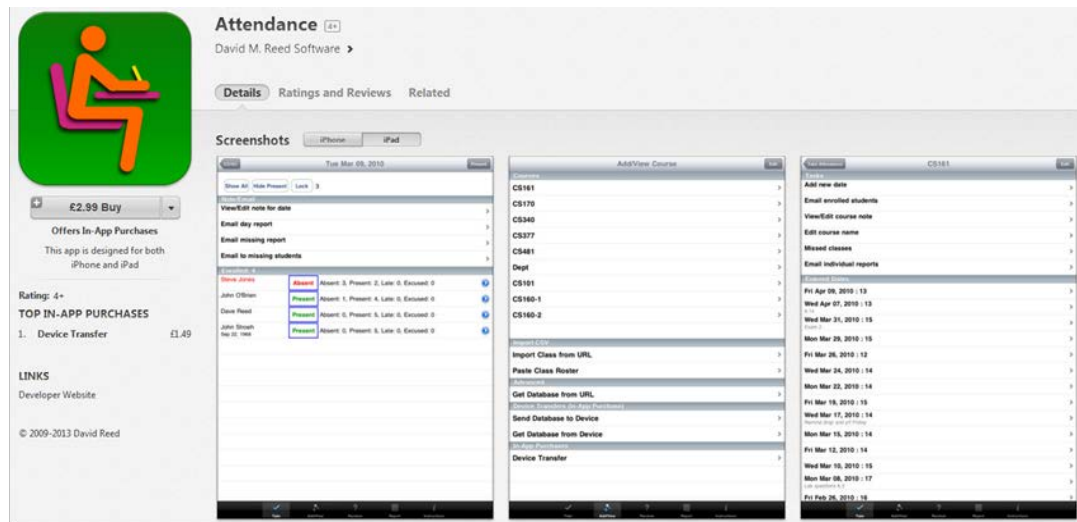
**Figure 4**: The *Attendance* app, by David M Reed Software.

This app allows you to download and import a .CSV file of your student information from Blackboard.  First, you set up the app by naming and adding a new class and session.  As you can see in figure 4, (pane 1) once you have set this up, the registrar simply taps the iPad screen to change the student's status from **ABSENT** (the default) to **PRESENT**.   You can also record students arriving **LATE** or those who were **EXCUSED**.   The register taken, you can then export the register out of the iPad via Dropbox into your PC for viewing and processing in Excel.

The output CSV file generated by *Attendance* for the group of MACE10492 students appeared as shown in figure 5 when opened in Excel.



| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MACE 10492 Electrical Energy Supply and Circuits | | | | | | | | | | | |
| 2 | | | Mon 29/09/2014 12:1 | Mon 29/09/2014 12:34 | Mon 29/09/2014 12:45 | Mon 29/09/2014 12:49 | Mon 29/09/2014 13:08 | Tue 30/09/2014 12:15 | Absent | Present | Excused | Late |
| 3 | Iffah | Ab Latib | | Present | Absent | Absent | Absent | Absent | 4 | 1 | 0 | 0 |
| 4 | Norman | Abadiano | | Present | Absent | Absent | Absent | Absent | 4 | 1 | 0 | 0 |
| 5 | Mohd | Abd Rahim | | Present | Absent | Absent | Absent | Absent | 4 | 1 | 0 | 0 |
| 6 | Abdul | Abd Rahman | | Excused | Absent | Absent | Absent | Absent | 4 | 0 | 1 | 0 |
| 7 | Hussain Ali | Abid | | Late | Absent | Absent | Absent | Absent | 4 | 0 | 0 | 1 |
| 8 | Syed | Abidi | | Late | Absent | Absent | Absent | Absent | 4 | 0 | 0 | 1 |
| 9 | Gabriela | Adamczyk | | Excused | Absent | Absent | Absent | Absent | 4 | 0 | 1 | 0 |
| 10 | William | Adams | | Present | Absent | Absent | Absent | Absent | 4 | 1 | 0 | 0 |
| 11 | Nyamebekyere | Addae-Dapaah | | Present | Absent | Absent | Absent | Absent | 4 | 1 | 0 | 0 |
| 12 | Indre | Adomaviciute | | Absent | Absent | Absent | Absent | Absent | 5 | 0 | 0 | 0 |
| 13 | Alexander | Agboola - Dobson | | Absent | Absent | Absent | Absent | Absent | 5 | 0 | 0 | 0 |

Figure 5: The CSV file opened in Excel.

This solution seemed to have real potential, but a search over the weekend on the [David Reed website] *(Reed is a lecturer in computer science at Capital University in Columbus, Ohio who developed **Attendance**)* I found there was an upgrade available called, ***Attendance2***.

(**Note:**  a search on Attendance2 in iTunes didn't show in the search results)

## 1.4. *Attendance2*

***Attendance2*** launched on the App Store in 2013. There are two new features with Attendance2. One allows you to add photographs of students, as shown in figure 6, pane 1 (*and where a photo doesn't exist, you can take one with the iPad's camera.*)
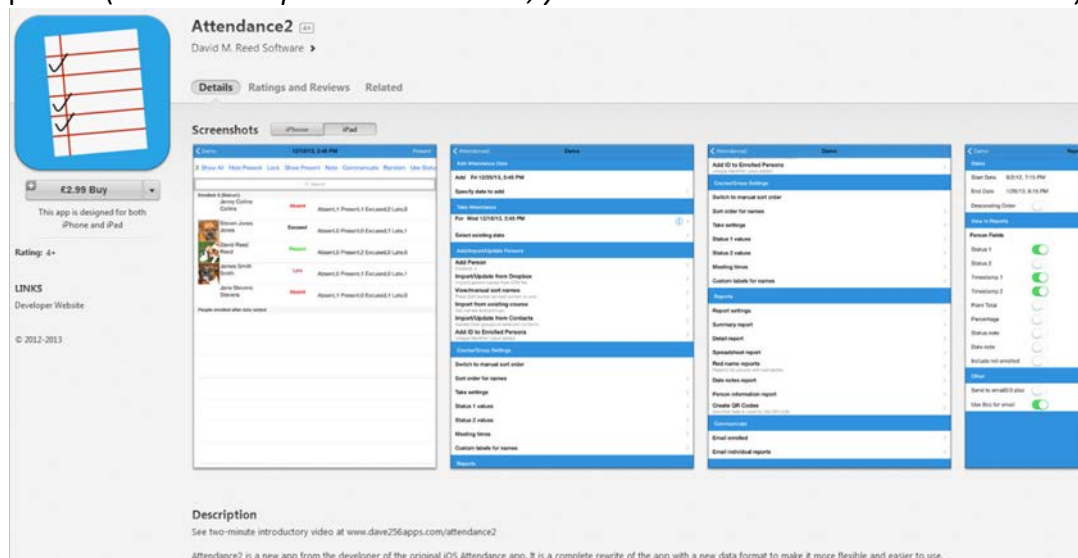


**Figure 6:** Attendance2, upgraded to include student photographs and QR code generation



The second useful addition in ***Attendance2,*** is the use of QR (Quick Response) codes, where the app itself generates a unique QR code for each student. To speed up registration, the student simply scans their code into a QR Reader on the iPad screen to register their attendance.

**Figure 7**: A typical QR code.

After uploading the CSV file for MACE 10492 into ***Attendance2***, this generated a list of QR codes for the student group and saved them into Dropbox. These could, if needed, be given out on paper so students could paste them into their diary, or they could be printed on a card to put them in a wallet or purse. Ideally the QR code could be printed directly onto the UOM ID Card (hopefully next year.) Another method would be to email the QR code to the student so they have it stored on their mobile phone, (and used as small cash transactions are now carried out in cafe's etc.) which they can then scan on registration. *(Alternatively, the student's name can still be taken by tapping **ABSENT, PRESENT, LATE, EXCUSED** etc on the main app screen.)*

**Figure 8:** Showing a sample of four QR codes generated by *Attendance2* for the MACE 10492 student group out of the 300 for the whole class.


In Part 2, we will look at how to use the *Attendance2* app and how it works with Blackboard.

# Part 2:

## 2.1 Using *Attendance2* to capture attendance.

This section looks at how use *Attendance2* to gather attendances.

Figure 9 shows the Blackboard course for the MACE 10492 undergraduate course which runs in the School of MACE.  Like all Blackboard courses it has its own Grade Centre containing student names including surname, forenames, usernames and id numbers.
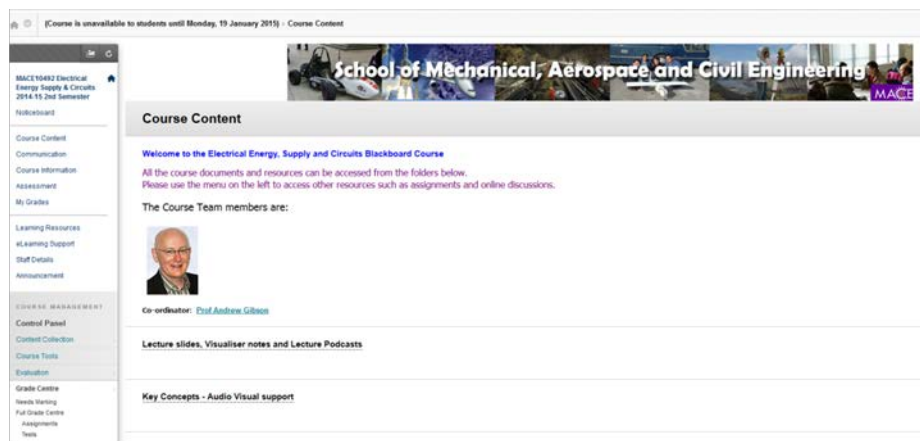


**Figure 9**:  The MACE 10492 Blackboard unit for 2014-15.

The first task is to export part of the Grade Centre information into a spreadsheet for some minor editing.  With Blackboard's Edit Mode switch **'ON,'** Click on Grade Centre > **Full Grade Centre.**  Figure 10 shows the **Work Offline** button on the right. Click On, **Work Offline > Download**.
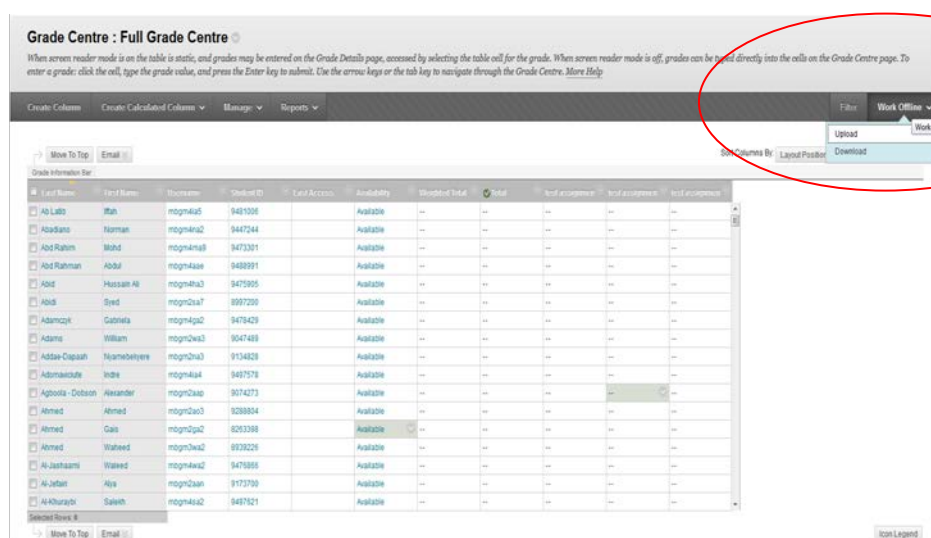


**Figure 10**: Blackboard Grade Centre and the 'Work Offline' download option.

**Figure 11** shows Blackboard's, **Download Grades** screen. Under the **DATA** section select, '**User Information Only**.' This will only export the basic student data rather than the complete Grade Centre and all its columns. Under **OPTIONS**, select, **'COMMA'** and for the Hidden information, **'No'**. Lastly, under **SAVE LOCATION**, select **My Computer**.

Finally click-on the **Submit** button.



**Figure 11**: Download Grades screen.

Blackboard will then respond with a confirmation message (Figure 12).



**Figure 12:** Download Grades confirmation button.

After clicking on the Download button, the MS-Office prompt appears asking if you want to Open or Save the file.

Choose the **Open** option as shown in Figure 13 and click on **'OK'**.
*(You can choose Save if you prefer, and save the file to your Desktop – though you can do this later if you Open the file now.)*
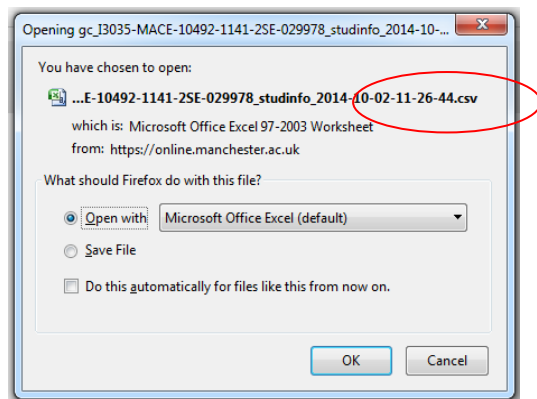
**Figure 13**: The file you download is identified by its long course ID number and the date and time you downloaded it.

It should have a **.csv** extension.

The .csv file should open and look something like Figure 14. The only data we need are the student surname, first name and the username. as a secondary check (or you could use the student ID but only one column is needed to generate the QR Code per student) so we can delete the other columns. Click on Columns, D, E and F, right-click your mouse and delete them.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 | Last Name | First Name | Username | Student ID | Last Access | Availability |
| 2 | Ab Latib | Iffah | mbgm4ia5 | 9481006 | | Yes |
| 3 | Abadiano | Norman | mbgm4na2 | 9447244 | | Yes |
| 4 | Abd Rahim | Mohd | mbgm4ma9 | 9473301 | | Yes |
| 5 | Abd Rahman | Abdul | mbgm4aae | 9488991 | | Yes |
| 6 | Abid | Hussain Ali | mbgm4ha3 | 9475905 | | Yes |
| 7 | Abidi | Syed | mbgm2sa7 | 8997200 | | Yes |
| 8 | Adamczyk | Gabriela | mbgm4ga2 | 9478429 | | Yes |
| 9 | Adams | William | mbgm2wa3 | 9047489 | | Yes |
| 10 | Addae-Dapaah | Nyamebekyere | mbgm2na3 | 9134828 | | Yes |
| 11 | Adomaviciute | Indre | mbgm4ia4 | 9497578 | | Yes |
| 12 | Agboola - Dobsc | Alexander | mbgm2aap | 9074273 | | Yes |
| 13 | Ahmed | Ahmed | mbgm2ao3 | 9288804 | | Yes |
| 14 | Ahmed | Gais | mbgm2ga2 | 8263398 | | Yes |

**Figure 14**: The Excel spreadsheet you need to edit.

There are only a further few small changes to make. The column headings need to be changed to the format that **_Attendance2_** identifies.

> **Last Name** needs to become,  **lastName**
> **First Name** needs to become,  **firstName**
> and
> **Username** needs to become **identifier**

*(The field names used are case-sensitive.)*

**Note:** You will only need to do this once for each class. You can add / delete individual students using the app if you need to.

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Your spreadsheet should now look like the example in Figure 15.



**Figure 15**: showing the new field names

OK, that's the student data file created.

Click on **Save As** to save the changes you have made to the spreadsheet and rename it. I have called my new file *MACE 10492 Electrical Circuits 2014-15*.

**The next important thing to do** is to make sure the file is saved as a **.csv** as shown in figure 16.
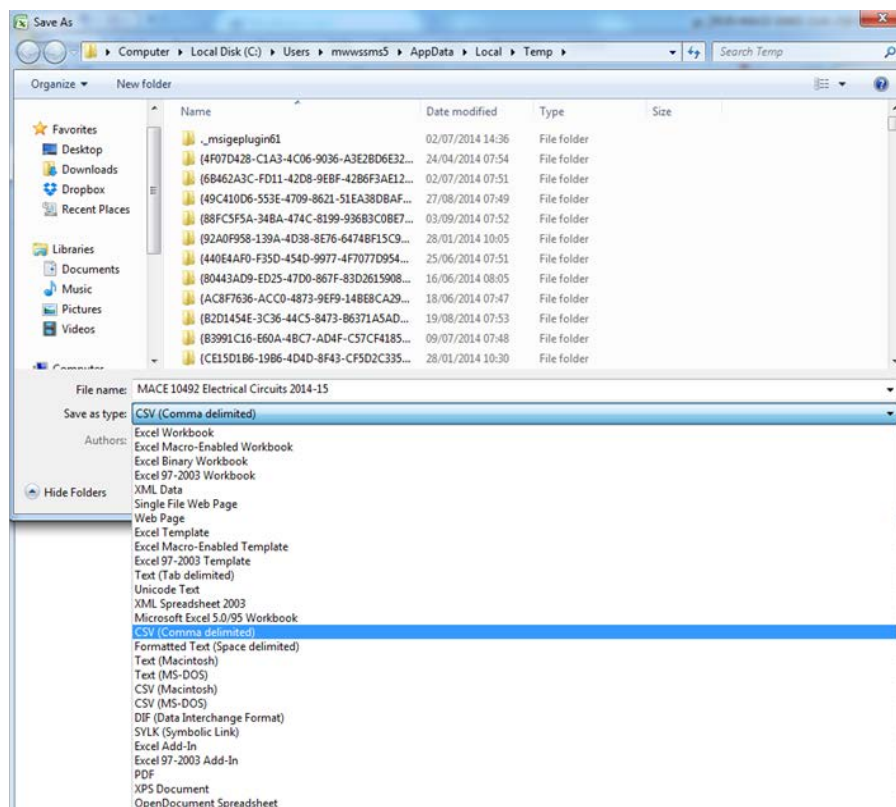


**Figure 16**: Saving the student data file as a **CSV** file.

Make sure the student data file is somewhere handy on your PC's desktop as you are going to move it to Dropbox.



**Dropbox** is a free file hosting service operated by Dropbox, Inc. You need to have a Dropbox account so you can move the **.csv** file from your PC into your iPad.

If you don't have a Dropbox account you need to set one up on your PC. You will be able to transfer your PC files from your PC into the Dropbox and link your iPad to it so you can import and export your files, make files available from other computers mobile devices, smartphones etc.

If you have set up Dropbox on your PC, you need to set up a folder structure so the data files will be stored in the right place.

In Dropbox **create a new folder** and call it   **Apps**

Inside that folder create another folder called   **Attendance2**
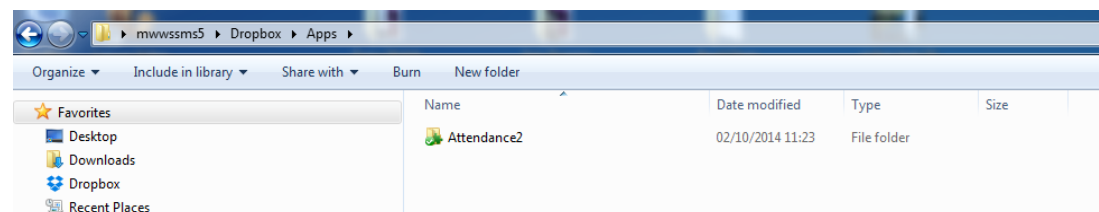


**Figure 17:** Dropbox with the **Attendance2** folder you created.

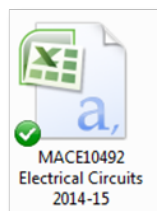**Next drag and drop (or copy) the student data .csv file into the Attendance2 folder you created in Dropbox.**



**Figure 18:** You need to place a copy of your student data file in the Attendance2 folder in Dropbox.

That's all you need to do for now on your PC.

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## 2.2 Setting up your iPad

For the next stage, you need to use your iPad. If you have only just started using your iPad, you will first need to set up an Apple iTunes account. If you already have an iTunes account, then you are ready to download **two iPad Apps.**

The first app you need to download via the App Store is the **Dropbox** app so you can access the **.csv** student data file you created earlier.
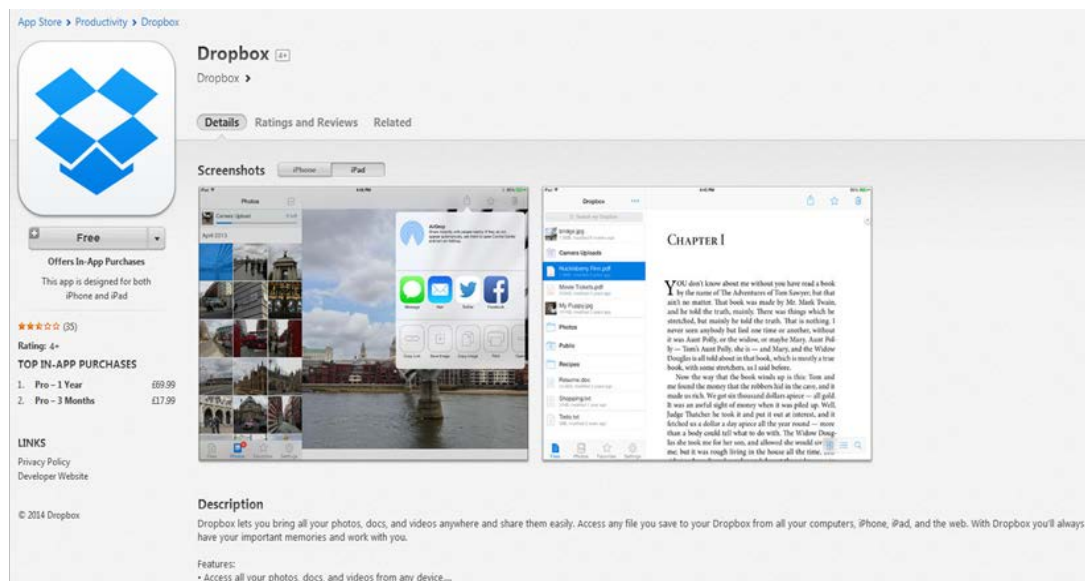


**Figure 19**: Dropbox in the App Store.

Download and install the Dropbox app.

Once you have done that you can log into Dropbox (on the iPad) using the same username and password that you set up/use for/on Dropbox on your PC.

So long as your local Wi-Fi connection is working, the Dropbox account on your PC will now synchronise with the Dropbox on your iPad, so both Dropboxes will contain the same set of files and folders. *(You should see Dropbox's small, blue progress wheel turning when synchronising is taking place.)*

Next, check the Dropbox on your iPad to make sure the **.csv** file appears in there.

## 2.3 The *Attendance2* app

The second App you need to download is **Attendance2.** The app is available on the iTunes Store and costs £2.99. The iTunes page shown below in Figure 20 will tell you more about what the Attendance app can do and how it integrates with Blackboard etc.

Go into iTunes store now and download the **Attendance2** app to your iPad.

### What can *Attendance2* do?

Attendance2 is a powerful relational database that allows you to input data in the form of weekly attendance, student photographs, and output reports and QR codes.

Figure 20 from the iTunes App Store takes you though the basics of what it can offer.
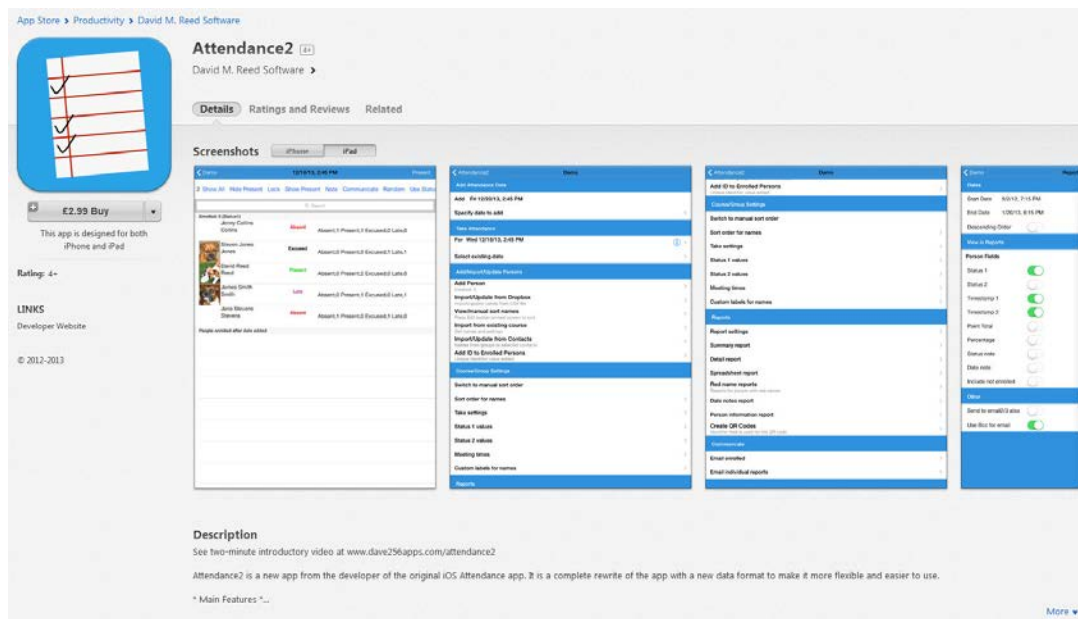


**Figure 20**: '**Attendance2**' detailed in the App Store.

## 2.4 Setting up a New Register for a Class

The first thing you need to do is how to set up a new register for your class. Using my MACE 10492 as an example, follow these steps.

Open the *Attendance2* app.

The *Attendance2* opening screen on your iPad should look like figure 21,



**Figure 21**: Attendance2's home screen.

Click on the ✚ to add a new course title. I have three courses set up here already.

**Add Course Named:** will appear. In the empty box enter the name of your course in full.
Tap the **Add** link under the box.

After adding your course title, the Course screen shown in figure 22 appears.
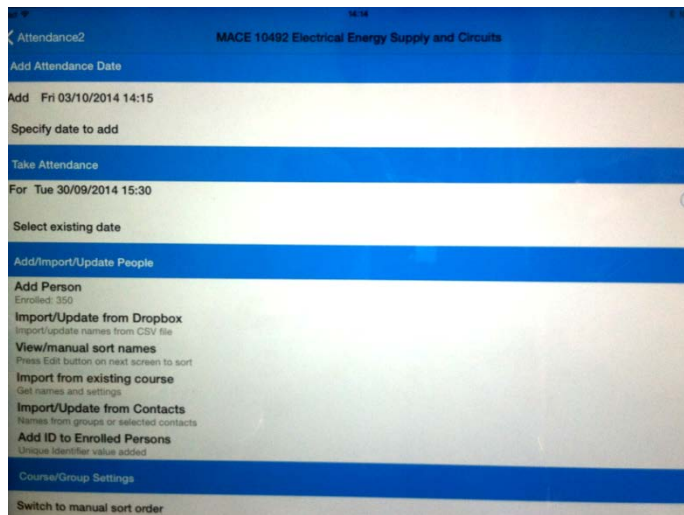
**Figure 22**: The Course screen with the name of your course appears.

Next is to import the student data .csv file.

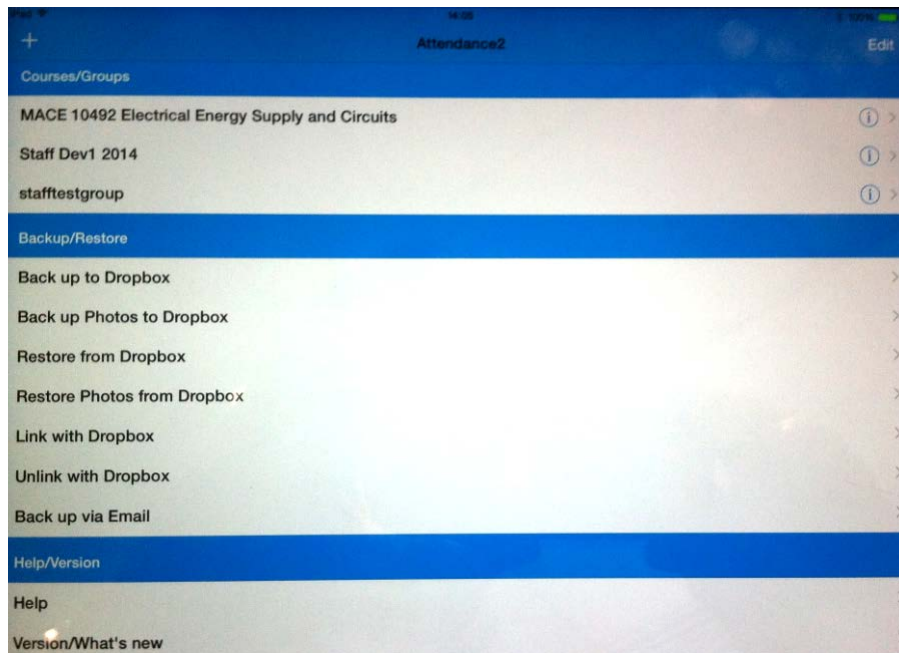Tap the **Import/Update from Dropbox** link.

That will open another screen that shows the csv files available to import. Find the file you transferred to your Dropbox on the iPad.

It will have a **forward-slash** symbol before it and look something like,

# /MACE 10492 Electrical Circuits 2014-15.csv

Tap the .csv filename and you should see your student data file imported as shown in figure 23. You should see the three columns and your student names and username.



**Figure 23**: Your student data imported to *Attendance2*.

Tap the **First Line** link.

You should see on your screen the names of the fields as shown below,

**lastName**
lastName
**firstName**
firstName
**identifier**
identifier

Tap the **Import** link  (it is top right on your iPad screen.)  *Attendance2* then displays a message for you to import the first line.
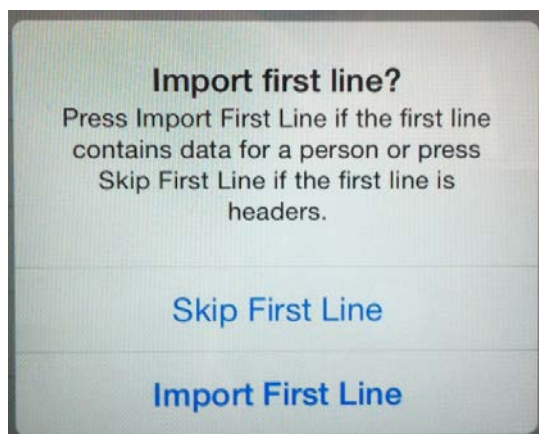


**Figure 24**:  The Import message box.

Tap the **Skip First Line** option shown.  This will put another message on your screen as shown in figure 25.
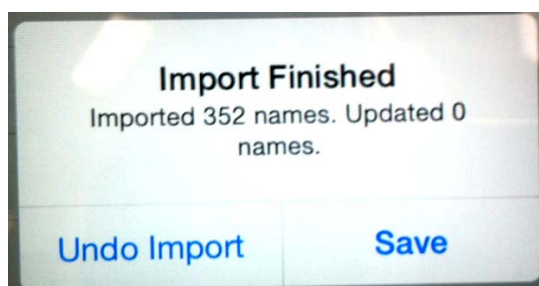


**Figure 25**:  The Import Finished confirmation showing how many names were imported.  In my case **352**.

Tap the **Save** option.
Next we need to add the sessions the class meets.  This can be done on an on-going basis or pre-set if you know when the group meet.

The next step is to add the date(s) of your classes.  You do this by adding a specific date.

## Tap, **Specify date to add**
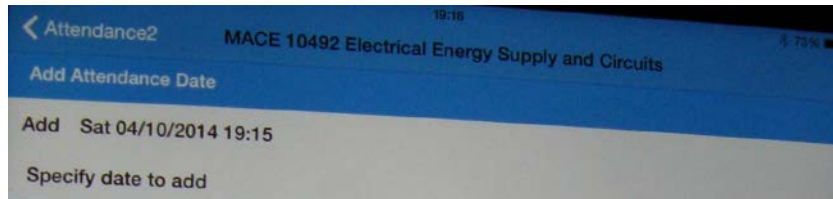


**Figure 26**:  Specify date to add.

Attendance2 returns with the date and time of the session you want to record.
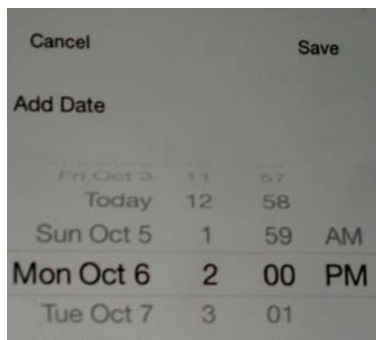


**Figure 26**: Setting the date and time of the session.

Rotate the dials for the **date and time** you want and then tap, **Save.**

If you wish, you can set all the dates and times for the sessions you want at this stage.  Repeat the previous step adding all the dates you want, clicking on Save each time.

If you added a number of sessions, tap on, **Select existing date.**



**Figure 27**:  Dates you have set for the sessions you need.

You can delete the dates if you wish by tapping the date and **Edit.**  You will then see the **Delete** option appear.

## 2.5  Taking the Register Manually

With your sessions now set up, you can take the register for the current session and record the attendances.  For small tutorial groups, if you wished, you could take the register manually following these next steps.  For much larger groups, that's where the QR codes come into their own and we will look at this in part 2.7.

Tap the **Select existing date** and the **date** for the group you want to register.
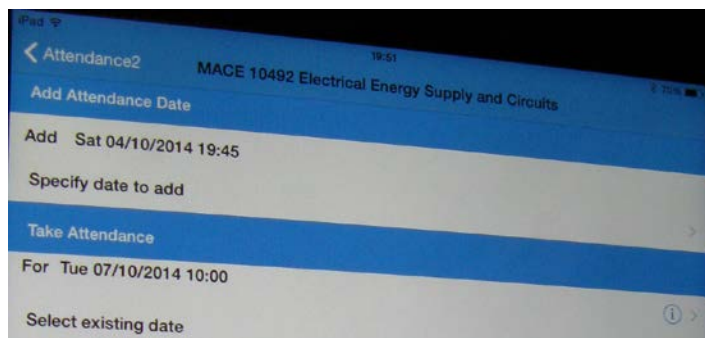


**Figure 28**:  Select existing date

Your register will appear with the date at the top and the names down the left.



Figure 29 shows the register for the 7<sup>th</sup> October session I set up.

The default status is set as **Absent.** You can change this to **Present, Late** or **Excused.**

**Figure 29**: A typical *Attendance2* register

Once you have taken the register, tap the **Lock** link at the top of the register page. You can always **Unlock** it later if you want to change anything but it will prevent any changes taking place.

## 2.6  Report Generation

If you want to email a report on the session you have just registered, go back to the Course screen shown in figure 30.



**Figure 30**:  The Course screen for my example course.

Scroll down the page and you will see the Report section.
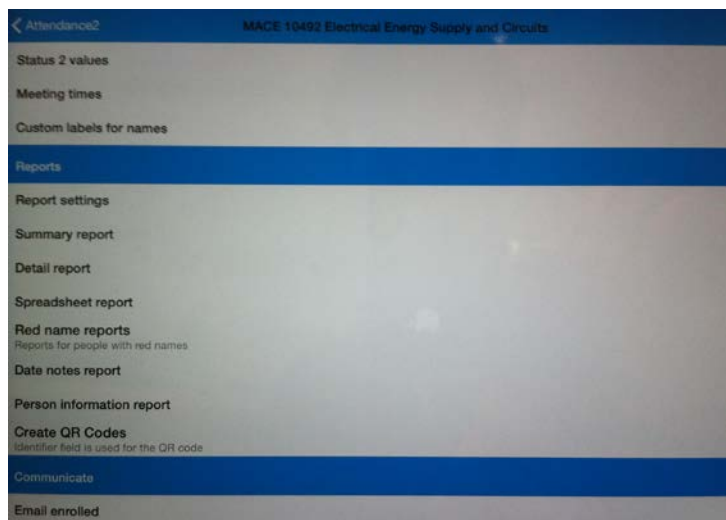


**Figure 31**:  The Report section of the Course screen.

Tap the **Spreadsheet report** link.
You should see a screen like the one in figure 32.



**Figure 32**: The register for the Course. Note that my example shows a number of sessions.

To export the register as a spreadsheet, tap the Dropbox link (in between the Email and View links).

Tapping the Dropbox link will return a screen with your course name and a **–report.csv** extension.

Tap the Save link. The report file will be saved in Dropbox on your iPad. If your Wi-Fi connection is working, the spreadsheet will be uploaded to your Dropbox on your PC. (If not it will the next time you have a Wi-Fi connection.)

Find your report file in Dropbox (it should the in the Apps/Attendance2 folder)
Open the file and you should see your register along with any other dates you have set similar to my example shown below.

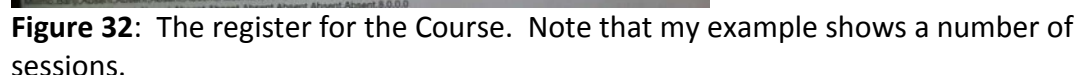| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MACE 10492 Electrical Energy Supply and Circuits | | | | | | | | | | | | | |
| 2 | | | Mon 06/10/2014 09:45 | Mon 06/10/2014 10:15 | Mon 06/10/2014 22:30 | Tue 07/10/2014 10:00 | Tue 14/10/2014 10:00 | Tue 21/10/2014 10:00 | Tue 28/10/201 4 10:00 | Tue 04/11/2014 10:00 | Absent | Present | Excused | Late |
| 3 | Iffah | Ab Latib | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 8 | 0 | 0 | 0 |
| 4 | Norman | Abadiano | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 5 | Mohd | Abd Rahim | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 6 | Abdul | Abd Rahman | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 7 | Hussain Ali | Abid | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 8 | Syed | Abidi | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 9 | Gabriela | Adamczyk | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 10 | William | Adams | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 11 | Nyamebekyere | Addae-Dapaah | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 12 | Indre | Adomaviciute | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 13 | Alexander | Agboola - Dobson | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 14 | Ahmed | Ahmed | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 15 | Gais | Ahmed | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 16 | Waheed | Ahmed | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 17 | Waleed | Al-Jashaami | Present | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 7 | 1 | 0 | 0 |
| 18 | Alya | Al-Jefairi | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 8 | 0 | 0 | 0 |
| 19 | Salekh | Al-Khuraybi | Absent | Absent | Absent | Absent | Absent | Absent | Absent | Absent | 8 | 0 | 0 | 0 |

**Figure 33**: A typical spreadsheet with the attendance data for the group for all the sessions you have set up.

## 2.7 Taking the Register with QR Codes

Taking the register with QR codes speeds up the capture of attendances, especially with large groups. QR Codes (Quick Response) codes are a kind of two-dimensional bar-code that hold alpha-numeric data. In data terms, we can use the student's computer username as these are unique to create the QR code. We could have chosen to use their ID number to generate the QR code, or something which is unique to the student. QR Codes need to be scanned by a camera, and for our application, we will be using the front camera on the iPad.

You can create the QR codes for the class as soon as you have imported your student .csv file and set up the register.

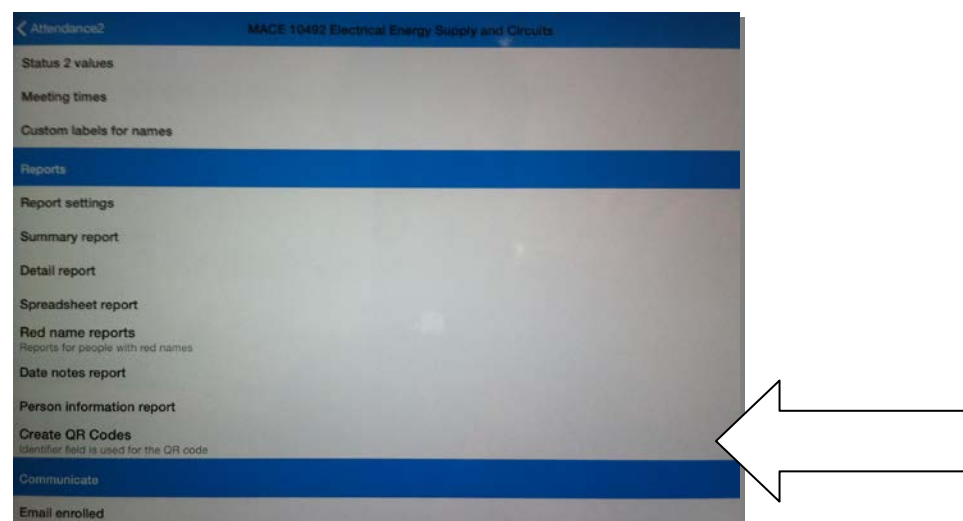On your Course page in the Reports section, you can see **Create QR Codes.**



**Figure 34**: Create QR code

In my example, my MACE10492 student data is already in my iPad. All you need to do if you have your student data uploaded is to tap the **Create QR Codes** link. What happens next is one of the clever parts of the Attendance2 app. The app generates a unique QR code for each student in a matter of seconds.



Jason Ashton
mmapzja4

Figure 35: A typical QR code generated for a student via *Attendance2.*

Copies of the QR codes are sent to your Dropbox in a folder for your group which look like the ones for my example group in figure 36.
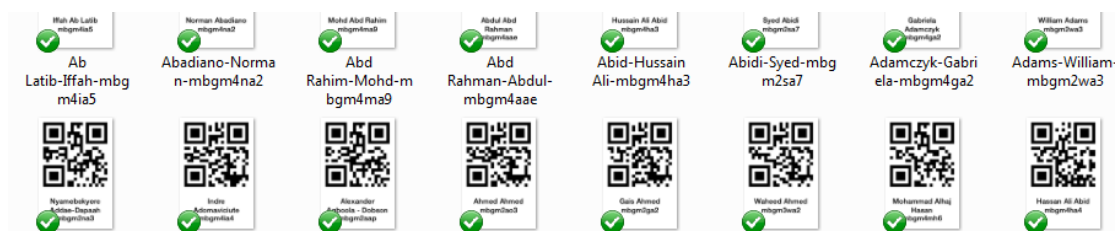
**Figure 36:** QR Codes for your student group.

The codes are held in a database in your iPad so that when you take the register using the codes, the camera reads the code, compares it with the code held in the database and updates the register with 'Present.' There is no need to scroll through the register to find the students name and mark them present.
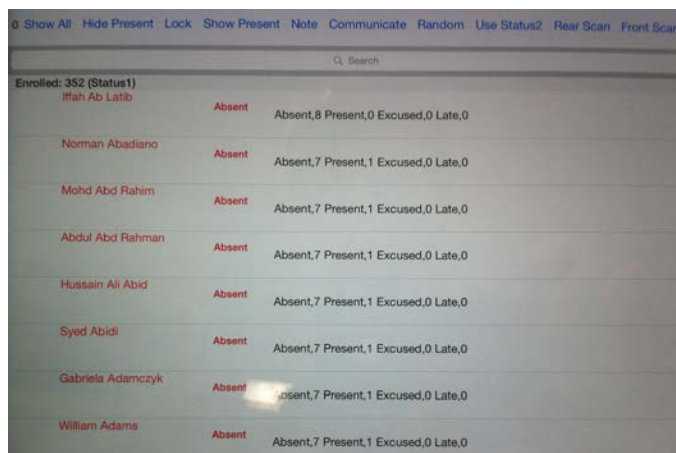
## 2.8 Testing the QR Codes

I printed off a set of QR codes generated by the app and copied them into Word to print them off 16 per side. I laminated a few sheets and cut them up using a portable guillotine. I enlarged some QR Codes and also reduced some in scale to check if the size of the images mattered. I also ran off some dummy QR codes I printed from a number of Google sites to see how *Attendance2* would react.

The card bench trial worked without any error. The smaller QR codes took slightly longer to capture until they were moved closer to the reader screen. This size of codes tested, (approximately 15mm – 20mm square) worked fine and this size would fit onto the students ID card. The codes generated by the app worked without a problem as did the enlarged codes.

The **false QR Codes** from Google were ignored by *Attendance2*. What happened was the website they were taken from appeared as a broken hyperlink at the top of the capture screen with ERROR alongside.

## 2.9  Working with QR Code reader

To use the QR codes to record attendances, you need to have your register open on the screen as shown in figure 37.



Rear and Front Scan

**Figure 37:** The register screen with the toolbar showing.

Along to the top of the screen are the **Rear Screen** and **Front Screen** links.

You can use either the **Rear screen** camera or the **Front facing** camera option on your iPad. Tap on either link. You should see a screen like the one in figure 38.

The camera is now ready to scan any QR codes from your students. All you need to do is hold up a QR code card, about 6-10 inches from the small window on the screen and the image will be recorded. The iPad should bleep when a scan has been successful and the screen go temporarily dim. QR codes that were slightly off square worked OK also.



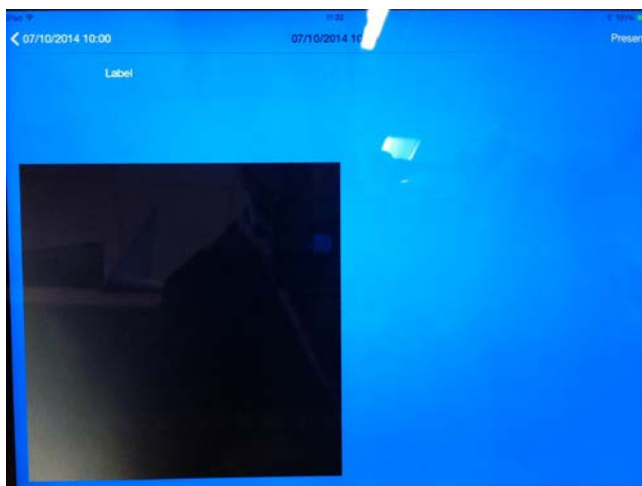**Figure 38:** The Front screen QR capture / iPad camera screen

Students simply scan their codes against the camera window and their presence will be recorded by Attendance2.
Once you have finished scanning, tap the **date** (*07/10/2014 in figure 38*) link top-left of the screen and you will go back to your class register. Open the register and check that the students have been recorded as present.

The '**Presents'** should all be coloured green.

**Lock the register** and you can now export the register by going back to the Course screen and tapping on Spreadsheet Report and selecting Dropbox.
That will upload a copy of the .csv file to your spreadsheet as you did with the manual registration on the previous step.

## 2.10  Mobile Phone QR code test

I checked that the QR codes worked from a mobile phone by importing seven codes to my phone as an email attachment.  All seven codes were read.  I used the same seven codes directly from the "Photos" app on my iPhone.  Again, all seven codes were read when the photos displayed the full screen.

## 2.11 Adding a new student record.

It is straightforward to add a new student and take their photograph in-situ with Attendance2.  On the Course screen you will see **Add Person**.
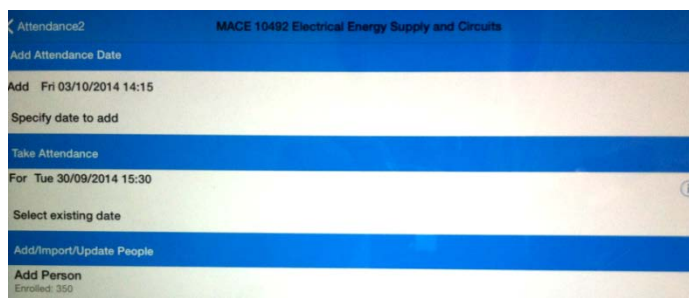


**Figure 39:**  Add Person link

On the Add Person screen you can add anyone who wasn't imported from your .CSV file.  You can also search your Dropbox and add their photograph, or if you don't have it you can take one with the iPad's camera.
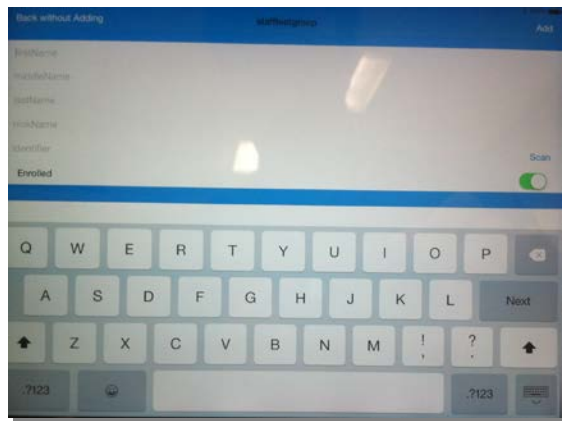
**Figure 40:** The Add person screen – scrolling down you will see Photo and the arrow link on the right will let you import or take a photo.

That completes the basic steps you need to use the basics of Attendance2 with your iPad, using Dropbox and .csv files.

Having bench tested the system, I needed to test it with a group of real students.  A report and a video of the trial with the MSc Management of Projects group is covered in the next section.

# Part 3

### 3.1 The Live Trial with Students

In October 2014 I obtained permission to run a trial of *Attendance2* with the **MSc Management of Projects** post graduate group of approximately **260** students.

As I didn't have access to the Blackboard course unit, I asked the Post Graduate Programme Administrator if I could have a copy of the student names and ID's from Grade Centre.

I edited the csv file and imported it into Attendance2 to generate the QR Codes. I imported the QR Codes to Microsoft Word, and re-aligned them (three across a page) so I could make the cards about credit-card size. ( I managed to fit 9 cards per A4 sheet) I then laminated the sheets (only to make them a bit more durable) and then cut them into separate cards roughly of the same (credit-card) size with a guillotine. All the QR codes were kept at the same size. (I had previously tested different QR code sizes in Part 2)

I first checked that all the laminated QR code cards worked by passing them through the front scanner on the iPad. All the cards registered a '**Present**' with no failures. The cards all scanned correctly at an optimum distance of approximately eight inches or 20 cm from the iPad window. Any further away and the QR code wouldn't register.

I also emailed a copy of the QR Codes to each students university email address, along with a message informing them of the trial.
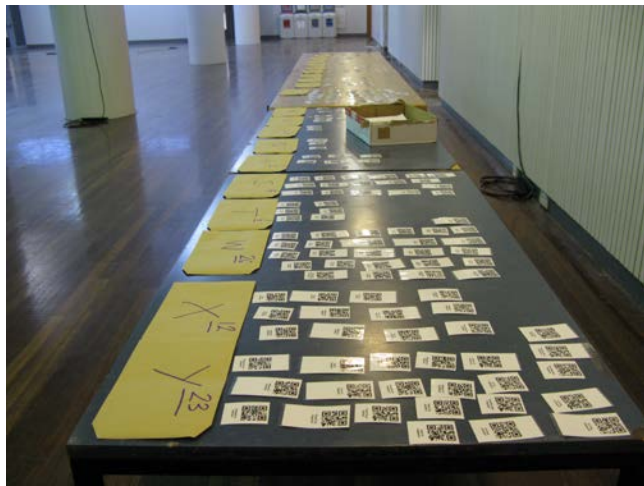


On the 23rd October, before the 9:00am lecture, I took all the QR cards over to Renold Building and set out the cards in alphabetical order outside Lecture Theatre C16 at 9:00am for the students to collect.

**Figure 41**

I had assistance in issuing the cards from Samantha Winkler and Jack Cursham who filmed the proceedings. **To see a 13 minute film of the trial log into the University Streaming Server at this address...**

https://stream.manchester.ac.uk/Play.aspx?VideoId=22788

Following the briefing session, the live trial use of the system took place the following week on the 30th October at the same venue.

## Live Trial - 30th October 2014

The MSc students began arriving for the morning lecture from 08:30 onwards. This was the first time the students had used the system so some familiarisation would reduce the future scanning-in time.

The *Attendance2* app and laminated cards worked well throughout the trial with the Management Of Projects group. There were some issues regarding;

**Laminated cards**

- Students obstructing part of the code with their fingers / thumbs.
- There were some delays in scanning-in due to the hand-eye co-ordination of some students who found it difficult to place the QR code in the iPad read window.

**Mobile Phone users**

- The PNG images sent to students via an email attachment worked fine, so long as there was white-space around the image.
- Any menus or navigation arrows covering the QR Code did not work. Once students removed the menus the codes did work.

**Mobile Phone failures**

- **Two students** had mobile devices with cracks in the glass screen which didn't work.
- **Four students** had re-photographed their laminated card and then stored it in their photos folder on their phone. This had allowed light onto the QR Code damaging the image which couldn't be read.

By 08:45, the number of students starting to arrive started to increase and a queue formed. There were a few students who had not collected their cards from the previous week and other delays which you can see on the film.

## Trial Findings

One iPad was not enough to get all the students present (220) through before the start of the lecture.  There were delays though this was only the first time of operation.  Two iPads working in tandem would have eliminated the queue that formed from around 08:50am.  The spreadsheet data from two iPads could have been merged later.

By 9:10 however the queue had gone and the students (220) were all seated in the lecture theatre.  I spoke to the students and thanked them all for their help and their patience with the trial.

The trial showed that QR Codes can work for attendance monitoring of large groups.  As a consequence smaller class sizes  could also benefit.

**The big advantage in using the system** was the reporting facility of the *Attendance2* app.  At 09:45, shortly after I had returned to the office, I sent the spreadsheet report of the session to the course leader and teaching staff.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | MOP trial 2014-15 | | | | | | | |
| 2 | | | Thu 30/10/2014 09:00 | Arrived | Absent | Present | Excused | Late |
| 3 | Arina | Abdul Rahim | Absent | | 1 | 0 | 0 | 0 |
| 4 | Nadeera | Abdul Razak | Present | 08:40 | 0 | 1 | 0 | 0 |
| 5 | Christopher | Agbaje | Absent | | 1 | 0 | 0 | 0 |
| 6 | Emmanuel | Ahabwe | Present | 08:45 | 0 | 1 | 0 | 0 |
| 7 | Idris | Akanbi | Absent | | 1 | 0 | 0 | 0 |
| 8 | Ali | Al Jaradah | Absent | | 1 | 0 | 0 | 0 |
| 9 | Mohamad | Al Taki | Present | 09:05 | 0 | 1 | 0 | 0 |
| 10 | Vikaash | Alampalayam Sadhasivam | Present | 09:08 | 0 | 1 | 0 | 0 |
| 11 | Borislav | Aleksandrov | Present | 08:42 | 0 | 1 | 0 | 0 |
| 12 | Qi | An | Present | 08:48 | 0 | 1 | 0 | 0 |
| 13 | Danish | Ansari | Absent | | 1 | 0 | 0 | 0 |
| 14 | firstname | Anu | Present | 08:49 | 0 | 1 | 0 | 0 |
| 15 | Muhammad Fa | Bin Mohamed Azim | Present | 09:12 | 0 | 1 | 0 | 0 |
| 16 | Jung Hwan | Byun | Present | 08:40 | 0 | 1 | 0 | 0 |

**Figure 42**  The register for the trial session showing time of arrival and those present/absent

It was interesting that students opted to use the laminated card given to them rather than their phone.  (It was optional which medium they chose3) The ratio was approximately 5:1 in favour of using cards.

One course tutor asked if email addresses could be included in the report so he could contact absent students.  They can be but only if they are brought in with the .CSV file in the first place and in our trial only the student names and usernames were imported.

# Part 4:
## 4.1 Costs and implementation

To implement this system, staff would need to purchase;
- Apple iPad(s)  ( iPad Mini start from £249 )
- Apple iPad(s)  Smartcase  (approx £35 each)
- Apple iTunes card (£15 each) for the purchase of the **Attendance2** app (£2.99) Other apps required such as Dropbox, are free.
- If you have a PC, you need to be able to access Blackboard and a spreadsheet programme like Microsoft Excel to edit the .csv files.
- Some form of iPad holder is needed if the reader is to be desk mounted (I used an old painting easel).

Staff Training is needed and for staff familiar with iPads and Dropbox, the training to use **Attendance2** could be carried out in a 2-3 hour session. (Perhaps a full day for those with no iPad & Dropbox experience.)

**Other costs**

There would be a small cost for printing the QR Codes onto small laminated or plastic cards.

A good idea would be to print the QR Code directly onto the student ID card next to their photo (there is a 20mm x 20mm available space next to the photograph)

or an additional card printed and issued by the School specifically for attendance use.  For undergraduates, once the card was produced it would last for the duration of their course.
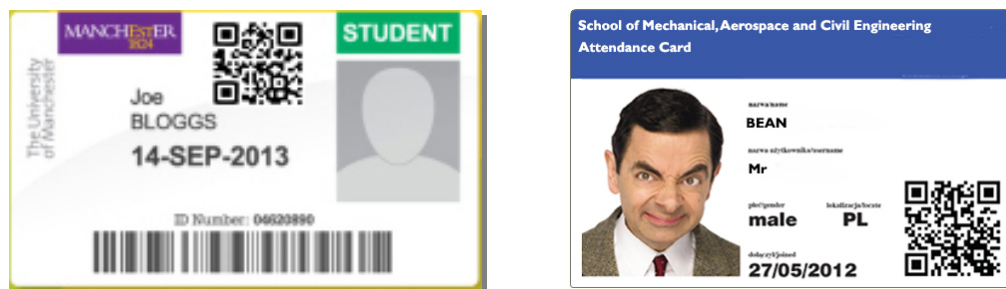


**Figure 43**  The current student card showing a QR Code added and the mock-up of a separate QR Code card for attendance use.

It would be fairly straightforward to generate a QR card for all students in the School and distribute them as email attachments.  Preparation time in advance of the first session is quite high, making cards, sending emails, but once cards and emails have been distributed and the electronic registers set up in Attendance2, the on-going workload per week is minimal.

## 4.2 Cost Benefits

- The main cost-benefit of implementing an electronic system like this one will be the saving of the programme administrators staff time in preparing lists and processing the attendance data. The system removes the need to prepare and create of paper-lists, clipboards and the secondary inputting of student attendances into spreadsheets.

- Using QR codes should eliminate false name recording where students are left to 'sign' on paper to register their attendance. Signing in twice would also be eliminated as Attendance2 will only register a positive once.

- With improvements in the speed of reporting, students who miss lectures will be identified and contacted much more quickly. In some cases, attendance reports with the current paper-based system are not made until the end of Semester.

- Attendance data can be distributed to a number of staff much quicker and easier by emailing the attendance spreadsheets straight from *Attendance2*.

- There would be no need for piece(s) of paper for staff to create, move process, or for students to sign, pass-round, doodle-on, or sign as someone else.



Thank you's go to the Management of Projects students for their help and patience during the trial and to Lecturers Paul Chan and Eric Lou for their help. Finally a big thank you to both Samantha Winkler and Jack Cursham for their support.

**Mike Smith**
**6 November 2014**
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# Setting up and taking the e-Register (Quick Guide)

**1.** Load your Blackboard course and download the student user data file from Grade Centre.

Blackboard

**2.** Edit the field names lastName, firstName and userName in Excel to what Attendance2 recognises and save as, **coursename.csv**

Excel

**3.** Copy the csv file to your Dropbox.

**4.** Dropbox synchs to your iPad so you can access the .csv file

**5.** you need a Wi-Fi enabled iPad, loaded with the Attendance2 and Dropbox Apps.

Attendance2

**6.** Set up a new class in Attendance2 and populate it with the student data from the .csv file

**7.** Generate the QR Codes for the class with the app.

**8.** The QR Codes automatically transfer to DropBox

**9.** Using Blackboard's Email tool, you can email the QR codes from your PC to each student and/or print the QR codes to laminated cards.

Blackboard

**10.** Students use their QR codes to 'scan-in' against the iPad camera window on entry to the lecture room using either their mobile phone or card.
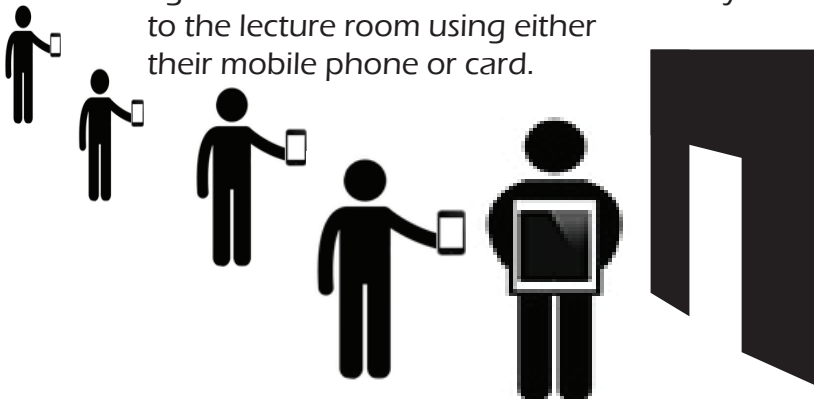
**11.** Finally you lock the register and send your student data as a .csv report to Dropbox and your register is a spreadsheet.

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