



Assessing pupils' progress in ICT at Key Stage 3: Standards File

Pupil E
Secure level 8



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Pupil E Secure Level 8

ICT Standards File

Summary

Pupil E's teacher designed an open-ended problem-solving activity which allows pupils to design and implement an integrated ICT-based system. The teacher provided an end-user to define the requirements of the system, and to provide feedback during the course of the project.

The file demonstrates that Pupil E is able to develop a solution to meet the needs of an end-user and shows sufficient command of ICT tools and techniques to develop an appropriate system. Pupil E has taken the needs of the user into account and has met those needs by developing an appropriate solution.

The teacher's overall judgement places him at a secure level 8.

The evidence

XtremeSkies

XtremeSkies

Context

The class was set the task of developing a solution to a problem posed by an end-user. The teacher had arranged for the end-user to interact with the pupils electronically via the learning platform.

The problem posed:



Photo by Divemasterking2000 entitled Skydiving Dec 07, spotting 2 from www.flickr.com/photos/divemasterking2000/2156349505 Used with kind permission. Screenshot of Fronter learning platform. © Fronter. Used with kind permission.

Pupil E's work

Pupil E took part in a discussion in his working group to work out what was required. He initially broke down the problem into subtasks:

1. Work out how to calculate parachute sizes
2. Work out how to store customer details and keep in touch with customers
3. Develop a corporate image for XtremeSkies and apply this to the user-interface and communication material for them
4. Decide how to incentivise customers.

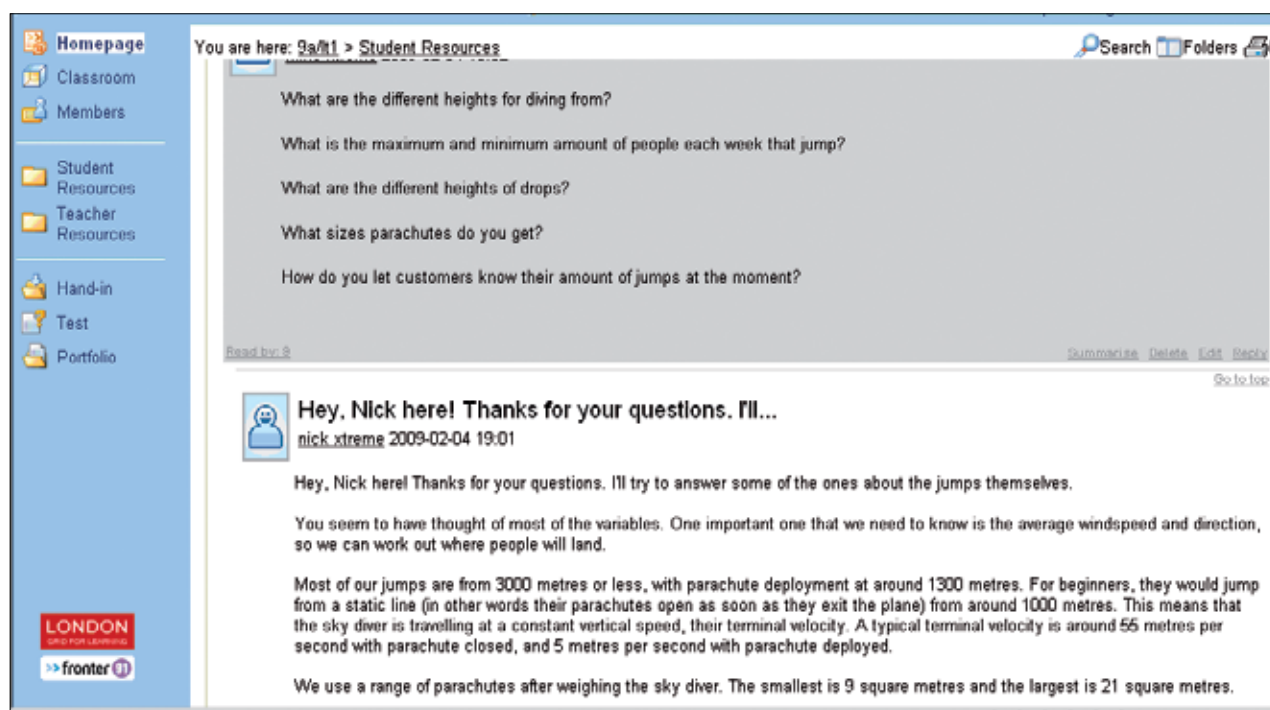
Pupil E realised he needed more information from XtremeSkies staff to be able to tackle the subtasks. He worked out what questions he needed to ask them and posted these on the forum that the end-users could access. This helped Pupil E to narrow down the problem and specify the requirements of the system. Pupil E suggested an incentive of printing a certificate for all customers who had completed a jump and different certificates depending on number of jumps (Bronze, Silver, Gold).

The four elements of the solution agreed with XtremeSkies were:

1. Create a system to generate certificates which include time spent in the air
2. Create a spreadsheet model to calculate parachute sizes and time spent in the air by a customer
3. Create a database to store customer details
4. Create a corporate image which gets across the idea of speed and adrenaline.

Pupil E recognised that *'The calculations must be accurate because this is a critical system and could cause death or injury if wrong'* and *'I need to have a way for the user to work with the system easily and without errors.'*

Pupil E's designs and prototyping showed how he had thought through the input, process and output requirements of the model. This was not a scenario he was familiar with and he had to ask his science teacher about some of the calculations. He also used a physics website to try and work out what some of the calculations were and how they would work.



Screenshot of Fronter learning platform. © Fronter. Used with kind permission.
Logo for the London Grid for Learning Trust. © LGfL. Used with kind permission.

The responses from XtremeSkies to any questions that he or any other pupil had asked were available via the forum in the learning platform at all times. This dialogue with the end-user continued throughout the work and helped to improve the system.

Pupil E tried several problem-solving approaches to break down the problem, including determining the inputs, processes and outputs.

Output	Input	Process
Parachute size	Mass in kg	Lookup size of parachute using mass entered
Time in the air	Height of plane Amount of drag	Calculations based on height and speed of falling (need to find out)

Pupil E also tried to show and understand what he was trying to accomplish by talking the problem through with his science teacher. His teacher explained how and why to work out terminal velocity using a formula to obtain the time in the air.

1000m

Speed = $\frac{\text{distance}}{\text{time}}$
time = $\frac{\text{distance}}{\text{speed}}$

terminal velocity = $\sqrt{\frac{2 \times \text{weight}}{\text{drag} \times \text{air} \times \text{area of parachute}}}$

Weight = $mg = \text{mass} \times \text{gravity}$
drag = 1.5
air = 1.29 (density of air)

Area of parachute = area converted to sq. metres from sq. feet
= Sq. feet $\times 0.9$

Parachutes

Q1	- upto 65 Kilo weight	- 170 ft ²	- 170 $\times 0.9$ sqm.
Q2	- upto 76	" " - 140 ft ²	- 140 $\times 0.9$ sqm
Q3	- " 87	" " - 160	- 160 $\times 0.9$
Q4	- " 98	" " - 180	- 180 $\times 0.9$

eg 1000m drop, with Q1 parachute, you weigh 45

time = $\frac{1000}{\sqrt{\frac{2 \times 45}{1.5 \times 1.29 \times 170 \times 0.9}}}$

Having spent some time prototyping, Pupil E made sure the calculations were giving the expected outcomes by using some sample data supplied by XtremeSkies from their most recent jumps. His checking and rechecking of the formulae was thorough.

'I named cell ranges used in vlookups to make entering the formulae easier.'

weightclass02	A	B	C	D
1				
2		Weight	Class	
3				
4		1	Can't dive	
5		44	Can't dive	
6		45 Q1		
7		50 Q1		
8		51 Q1		
9		55 Q1		
10		60 Q1		
11		65 Q2		
12		66 Q2		
13		70 Q2		
14		71 Q2		
15		75 Q2		
16		76 Q2		
17		77 Q3		
18		80 Q3		
19		86 Q3		
20		87 Q3		
21		88 Q4		
22		90 Q4		
23		95 Q4		
24		96	Can't dive	
25				
26				

'I've used absolute cell references when working out parachute areas.'

C28	A	B	C	D	E
1					
25					
26		Parachute Area		0.092903	
27					
28		Q1	11.14836	120	
29		Q2	13.00642	140	
30		Q3	14.86448	160	
31		Q4	16.72254	180	
32					
33					

'The hardest bit was working out terminal velocity because then I would be able to calculate time in the air.'

= (2*119/(25*(21*(C28)))^0.5												
	B	C	D	E	F	G	H	I	J	K	L	M
19	86	Q3					weight	499.8				
20	87	Q3					AIR	1.29				
21	88	Q4					Terminal velocity	6.807179				
22	90	Q4					area	11.14836				
23	95	Q4					Drag Co-efficient	1.5				
24	96	Can't dive					distance	1500				
25							Time in seconds	280.3556				
26	Parachute Area	0.092903					Time in mins	3.7				
27							speed of plane in Knots	30				
28	Q1	11.14836	120				speed of plane in M/S	15.43333				
29	Q2	13.00642	140									
30	Q3	14.86448	160									
31	Q4	16.72254	180									
32												

'Once I got the time in seconds, I had to change it into minutes and seconds. This took several steps but in the end I got it in a format which is useful for the user.'

=L32 & " min "& M30 & " sec"												
	C	D	E	F	G	H	I	J	K	L	M	
16	Q3					weight	499.8					
17	Q3					AIR	1.29					
18	Q4					Terminal velocity	6.807179					
19	Q4					area	11.14836					
20	Q4					Drag Co-efficient	1.5					
21	Can't dive					distance	1500					
22						Time in seconds	280.3556					
23						Time in mins	3.7					
24	Area	0.092903				speed of plane in Knots	30					
25						speed of plane in M/S	15.43333					
26	M:11.14836	120										
27	13.00642	140										
28	14.86448	160										
29	16.72254	180										
30												
31												
32												

Pupil E had yet to develop a corporate image and so worked on that next to determine how the user interface for the parachute model should look.

[illegible]

'The x and s are pretty good. Image looks fuzzy though and we want sharp, fast, active, whoosh...as the overall impression.'

This gave some clear user requirements and through additional questions of the end-user, Pupil E was able to develop success criteria:

- *They should be able to resize it without pixilation and even use it on the side of the plane therefore the final logo should be vector graphics so they can print it on their parachute, and we can use it in the parachute system on screen.*
- *The parachute model, the database of jumps and the certificate all need to use the same corporate image. So it should work well in print and on screen, in black and white and colour.*
- *I need a tag line for use on all screens and documents.*

A design idea was finalised using a vector drawing package, submitted via the learning platform and then tweaked after user feedback.



'I had to use the vector tools to represent the 'dot on the i' stick man and then group these together so I could rotate it.'

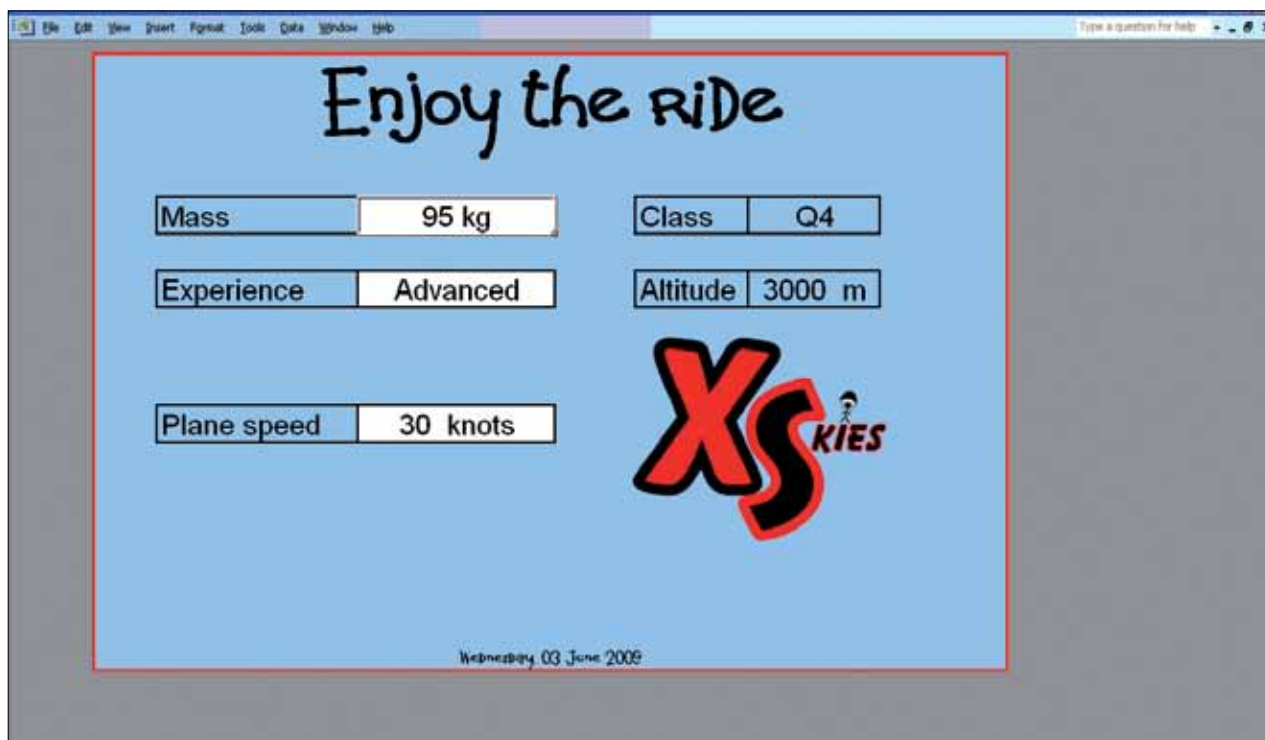


Pupil E decided to limit the colours he used to red and black. He explained his decision:

'Well with the credit crunch and everything, companies are saving costs so black and white printouts would be possible with the colours I've chosen. This way even if XtremeSkies decide to use only the black and white option on their printing my logo will work.'

Once the end-user was happy with the logo, it was exported as a Windows Metafile and the background was set to transparent so the logo could be imported into the model for the user interface.

The logo, the tag line (Enjoy the ride) and the colour scheme were agreed with XtremeSkies and applied to the parachute model and later the database.



For the user interface Pupil E locked all cells, apart from the ones the user needed to type into or select a drop-down. Pupil E removed sheet tabs, hid the formula bar and scroll bars and removed toolbars. He then protected the sheet.

Pupil E experimented with the use of only red and black but wasn't happy with his results:

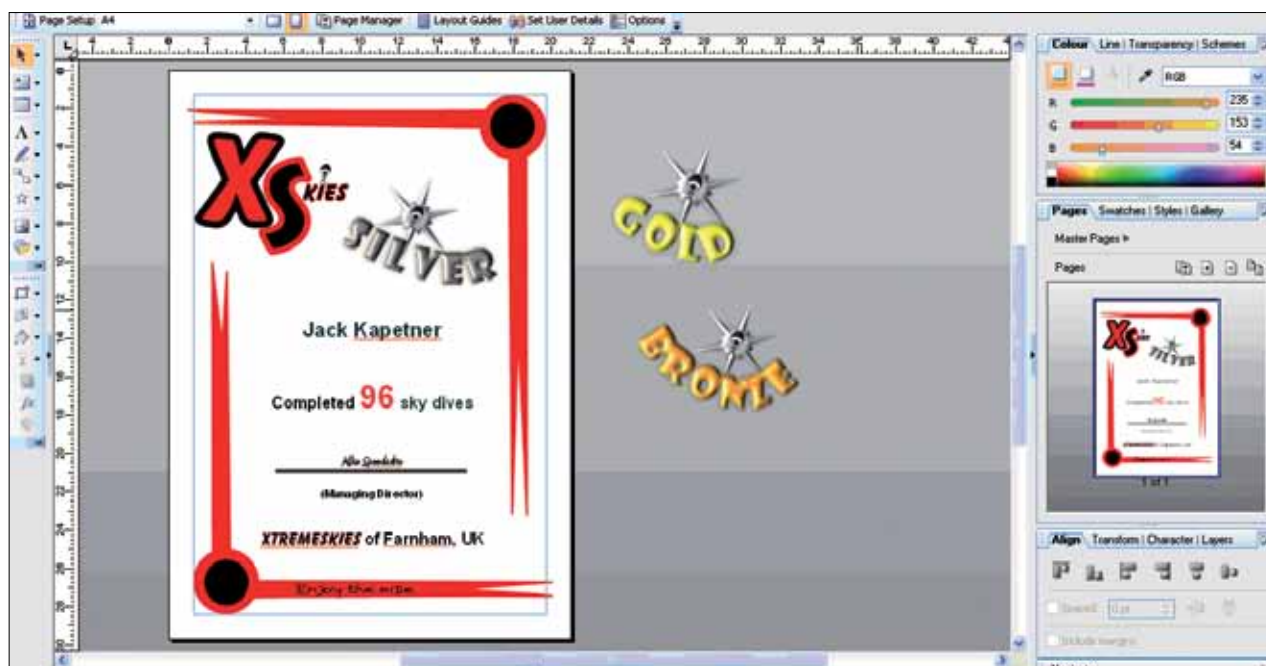
'The sky blue background colour was selected for the main screen so the text was legible on screen. Red and black was tried but it didn't really make it easy to read the text. In the end I made use of a neutral grey to complement the logo.'

Pupil E created a certificate using desktop publishing software. He made sure it adhered to the corporate image he had already created in terms of colours, fonts and logos.

He was clear about the success criteria:

The certificates must:

- be of a professional standard so they could be framed and displayed
- contain name and the correct number of jumps completed with XtremeSkies
- have slight variations in colour depending on the number of jumps, i.e. Bronze, Silver, Gold
- be printed on quality card
- use the tag line.



Screenshot of PagePlus software. © Serif (Europe) Ltd. Used with kind permission.

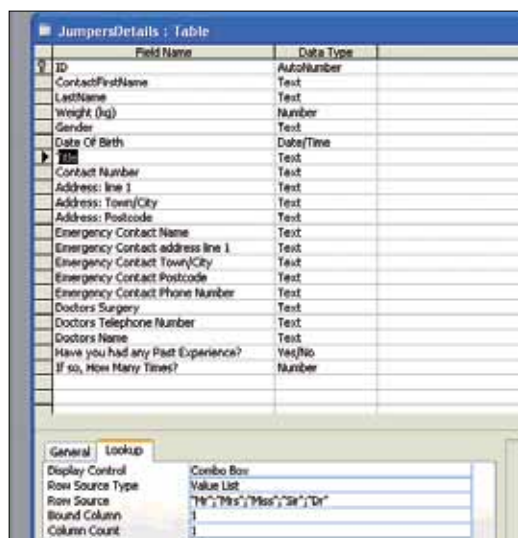
Pupil E made use of a number of techniques:

'I grouped the circles and edged lines together and then rotated them for use in the opposite corner. I added the stick man parachute to create the Gold, Silver and Bronze seals and embossed them to give the certificate depth. I had to get the text to follow a hand-drawn curved path and then change the character spacing.'

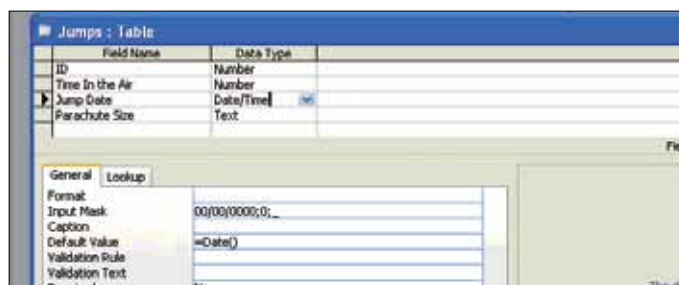
Pupil E created a database to hold details of customers. He set up fields, data types, lengths and other field properties. He created one table to hold personal customer data and then set up a separate table to hold information on jumps, including time in the air. He linked this table to the customer table.

The pupil used several features to make the database more efficient and to reduce input errors, including the following:

Drop-down boxes for certain fields

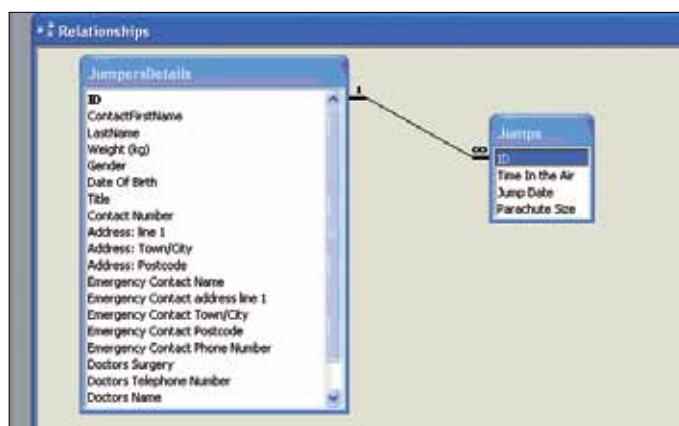


Default values for some fields – the jump date was set to 'date()' to minimise typing

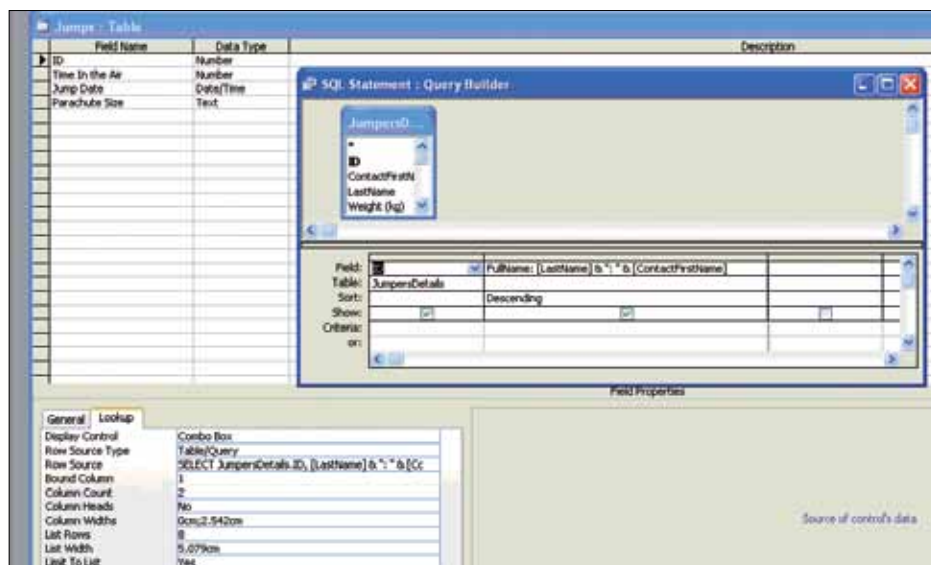


Linking the tables together using the lookup wizard and editing the relationships:

'You cannot have a customer in the Jumps table unless they are first in the customer table.'



Setting the looked-up field to display surname and first name in the same column:



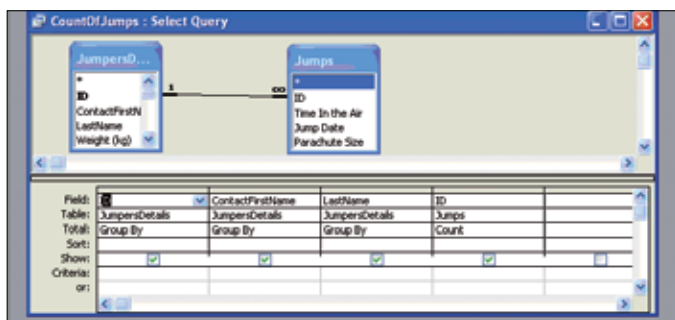
'It's better to have the ID field have people's names because sometimes people don't know what their number is. It makes it easier to add a customer to the Jumps table.'

ID	Time In the Air	Jump Date	Parachute Size
Jones, Tom	463	06/12/2008	Q3
Smythe, Conan	320	06/12/2008	Q4
Skreait, June	360	06/12/2008	Q4
Stoux, Kathryn	600	06/12/2008	
Jones, Tom	90	06/12/2008	
Harris, Charly	420	06/12/2008	
Halley, Crystal	120	06/12/2008	
Gibson, Jake	160	18/12/2009	B
Coley, Euan	576	06/12/2008	
Halley, Crystal	90	06/12/2008	
Halley, Crystal	290	06/12/2008	
Thomas, Lucas	10	23/12/2009	
Thomas, Lucas	70	06/12/2008	
Thomas, Lucas	160	06/12/2008	
Thomas, Lucas	90	06/12/2008	
Thomas, Lucas	450	06/12/2008	
Skreait, June	120	06/12/2008	Q1
Skreait, June	596	06/12/2008	
Gibson, Jake	10	01/04/2009	
Harris, Charly	10	01/04/2009	Q1
Smythe, Conan	10	01/04/2009	
	10	06/05/2009	

For security reasons, Pupil E decided to display customer details one record at a time only, using a form. He decided not to store credit card information:

'When someone pays for a jump, the transaction is taken care of by the bank over a secure internet connection so it is better to not store credit card info on the database.'

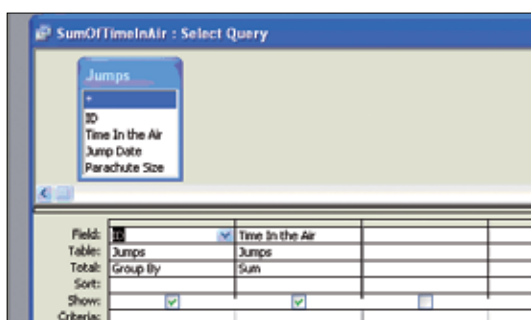
Pupil E worked out how to group together all the jumps taken by one person and then count how many there were. He created this query as follows:



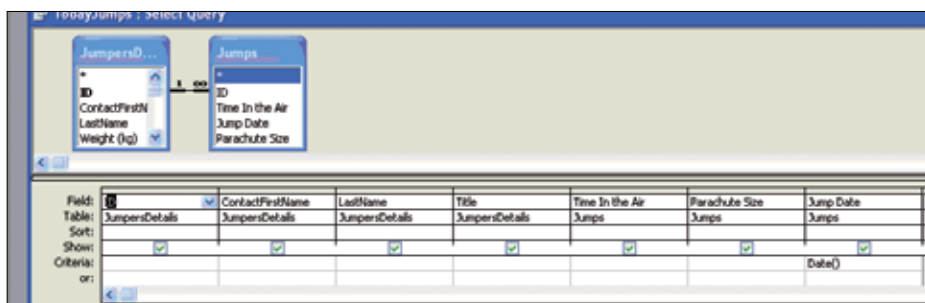
'I just got the query to add up how many times "ID" existed in the Jumps table and this gave me the results I needed.'

ID	Contact First Name	Last Name	CountOfID
1	Tim	Jones	1
2	Kathryn	Sioux	2
3	Veronica	White	3
4	Euan	Coley	3
5	Crystal	Hailey	2
6	Lucas	Thomas	5
7	Jume	Skreak	2
8	Jake	Gibson	1
9	Charly	Harris	1
10	Conran	Smythe	1

'I also added together how long someone spent in the air in total using the sum function.'



'The last query I did was to show today's jumps so parachute size and time in the air could be added easily for just that day. I then set up a form so this data could be added after the event.'



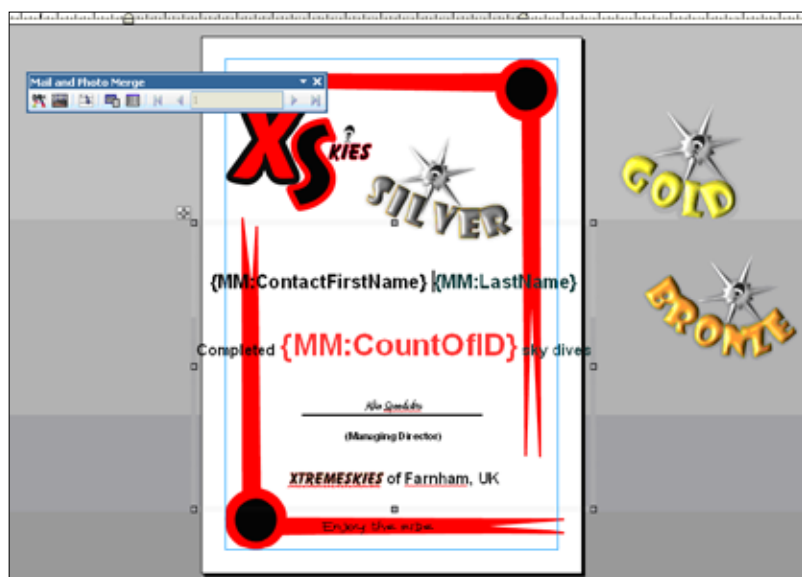
Date specific2

Today's Jumps for: 08/05/2009

	Title	First Name	Last Name	Time In the Air (Seconds)	Parachute Size
	Miss	Charly	Harris	10	Q1
	Sir	Lucas	Thomas	25	Q1
/	Mr	Jume	Skreak		Q2
*					Q1
					Q2
					Q3
					Q4

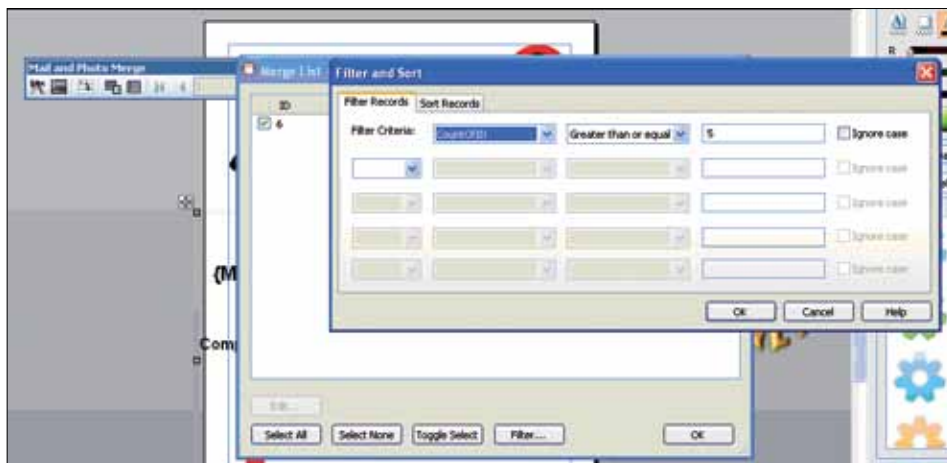
Pupil E then went back to generating a certificate for customers after a certain number of jumps:

'I used my CountOfJumps query to link to the certificates.'



Screenshot of PagePlus software. © Serif (Europe) Ltd. Used with kind permission.

He set a condition in the mail merge to filter only those people who qualified for a certificate.



Having completed the main elements of the system, Pupil E considered the user interface. He created data entry forms that were fit for purpose and set up a main form from which the user could navigate to the correct screen/form.

'I did the customer form and added a button to add a new customer and a way of finding customers from a drop-down. I hid the ID field because it was not necessary.'

The Jumper

Title: Mr
Contact First Name: Ian
Last Name: Jones
Date Of Birth: 11/04/1964
Weight (kg): 96
Gender: Male
Contact Number: 01234567890
Address: line 1: 3 Queenside
Address: Town/City: Ham
Address: Postcode: TW10 9RT

The Emergency Contact

Emergency Contact Name: Laura
Emergency Contact address line 1: 64 Crescent lane
Emergency Contact Town/City: Richmond
Emergency Contact Postcode: TW10 9RT
Emergency Contact Phone Number: 01234567890

The Doctor

Doctors Surgery: Dr. Heesh
Doctors Telephone Number: Whale surgery
02002000200

Add New Customer

Find:
Gibson

Go Back

Enjoy the Ride

Remind Jumper to: Check with your doctor first if you have a history of neck/back/heart problems, or if they are on any prescription drugs. They must not be under the influence of alcohol or non-prescription drugs.

Screenshot of PagePlus software. © Serif (Europe) Ltd. Used with kind permission.

'I added back buttons and the same tag line and logo to the forms.'

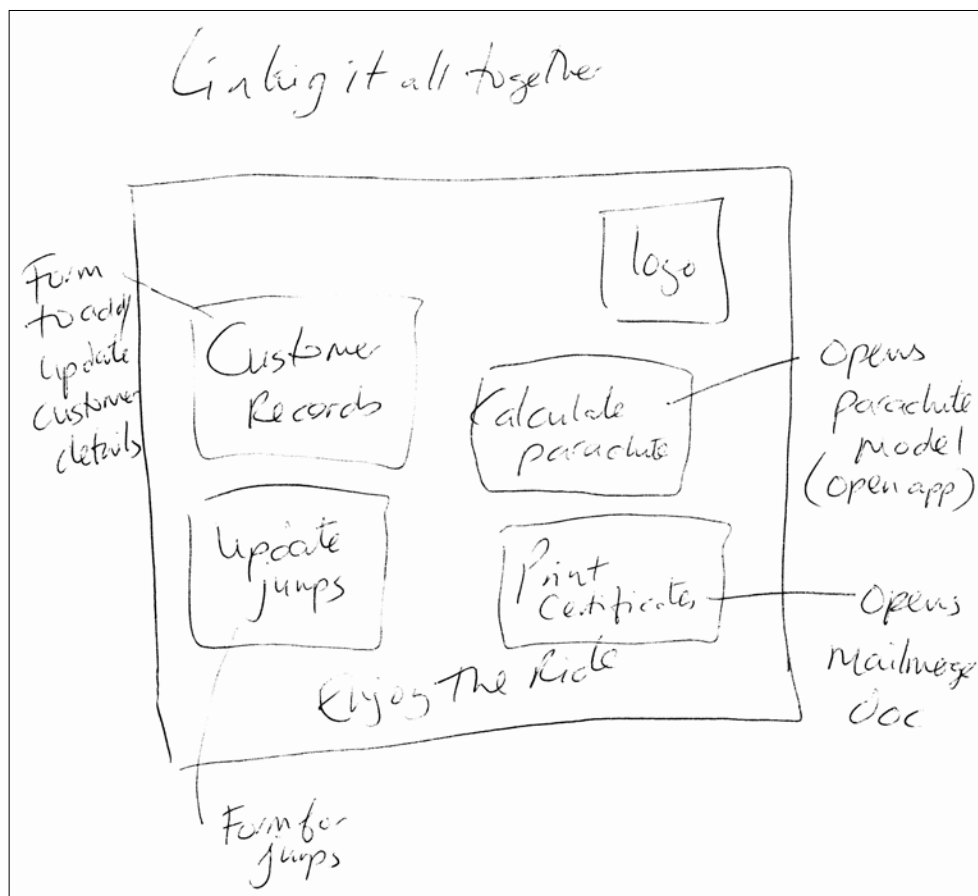
Today's Jumps for: 08/05/2009				
Title	First Name	Last Name	Time In the Air (Seconds)	Parachute Size
Miss	Charly	Harris	10	Q1
Sir	Lucas	Thomas	25	Q1
Mr	Jume	Skreak		Q2

Enjoy the Ride

Go Back

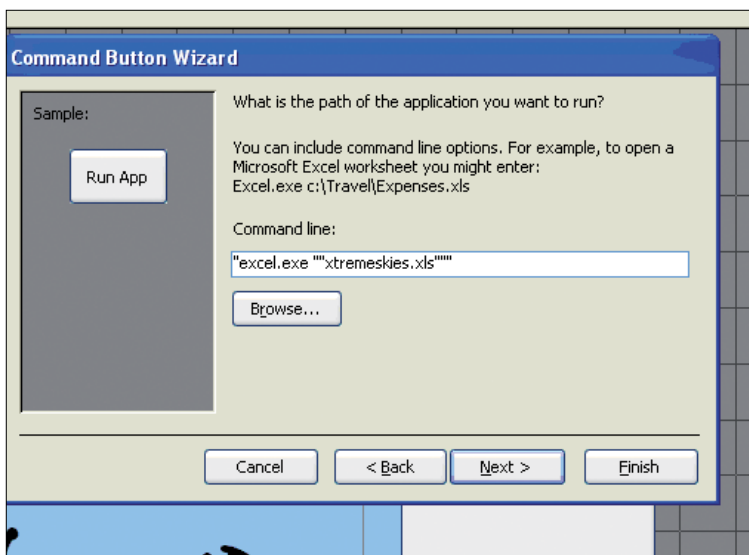


Once the different elements of the system were complete, Pupil E thought about how the user would interact with these. He created a main form in the database software with buttons to navigate to the parts of the database as well as other applications.





'To have the buttons open up the other applications, I had to set the application and file path when I set up the buttons.'



End-user response

Once the system had been completed, Pupil E made it available to the end-user via the learning platform for the purpose of gathering further comments.

'You can use the parachute model and the certificates straight from the website, but to get the customer records database, you have to download and save the file and run it from your own computer. I suggest you keep everything in the one folder.'

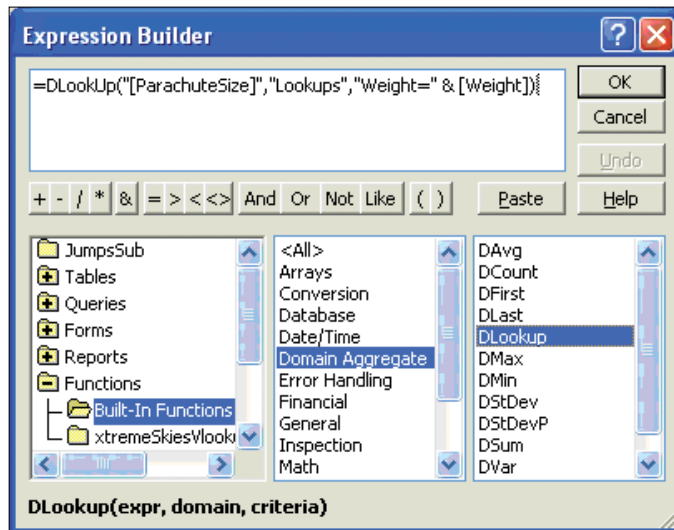
The user was not happy about having to enter the parachute size into the model and then after the jump, into the customer records and asked if there was a way of resolving this. Mike was also worried about the quality of the printing at XtremeSkies and the cost. He wanted to know if he could use pre-printed certificates.

As a result of this feedback, Pupil E thought about how he could incorporate the different elements into one application. He tried using a calculated field in his database to see whether he could come up with parachute sizes. He was unable to make this work and sought help from his teacher. The teacher helped him to realise that putting his calculation on parachute sizes into a table in his model would then enable him to import this into the database so he could use it to look up parachute sizes.

G10		=Altitude/E10									
1	A	B	C	D	E	F	G	H	I	J	K
Weight	Skill	Parachute:AreaOfPar	Velocity	BTimeSecs	ATimeSecs						
2	45 Beginner	Q1	11.14836	6.394231	156.390974	469.1729219					
3	46 Beginner	Q1	11.14836	6.464888	154.6817317	464.045195					
4	47 Beginner	Q1	11.14836	6.53478	153.027334	459.0820021					
5	48 Beginner	Q1	11.14836	6.603933	151.4249094	454.2747282					
6	49 Beginner	Q1	11.14836	6.67237	149.8717924	449.6153771					
7	50 Beginner	Q1	11.14836	6.740111	148.365505	445.0965149					
8	51 Beginner	Q1	11.14836	6.807179	146.9037402	440.7112206					
9	52 Beginner	Q1	11.14836	6.873592	145.4843471	436.4530413					
10	53 Beginner	Q1	11.14836	6.939369	144.1053174	432.3159523					
11	54 Beginner	Q1	11.14836	7.004529	142.7647737	428.2943211					
12	55 Beginner	Q1	11.14836	7.069088	141.4609585	424.3828755					
13	56 Beginner	Q1	11.14836	7.133063	140.1922247	420.5766742					
14	57 Beginner	Q1	11.14836	7.196469	138.9570269	416.8710806					
15	58 Beginner	Q1	11.14836	7.259322	137.7539131	413.2617393					
16	59 Beginner	Q1	11.14836	7.321635	136.581518	409.7445541					
17	60 Beginner	Q1	11.14836	7.383422	135.4385564	406.3156691					
18	61 Beginner	Q2	13.00642	6.892449	145.0863044	435.2589131					
19	62 Beginner	Q2	13.00642	6.948715	143.9114971	431.7344914					
20	63 Beginner	Q2	13.00642	7.004529	142.7647737	428.2943211					
21	64 Beginner	Q2	13.00642	7.069082	141.6450327	424.9350981					
22	65 Beginner	Q2	13.00642	7.114843	140.5512323	421.6536969					
23	66 Beginner	Q2	13.00642	7.169364	139.4823861	418.4471584					
24	67 Beginner	Q2	13.00642	7.223473	138.4375595	415.3126786					
25	68 Beginner	Q2	13.00642	7.27718	137.4158662	412.2475985					
26	69 Beginner	Q2	13.00642	7.330493	136.4164648	409.2493943					
27	70 Beginner	Q2	13.00642	7.383422	135.4385564	406.3156691					
28	71 Beginner	Q2	13.00642	7.435974	134.4813814	403.4441443					
29	72 Beginner	Q2	13.00642	7.488156	133.5442175	400.6326526					
30	73 Beginner	Q2	13.00642	7.539978	132.626377	397.8791309					
31	74 Beginner	Q2	13.00642	7.591446	131.7272047	395.1816142					
32	75 Beginner	Q2	13.00642	7.642568	130.8460764	392.5382293					
33	76 Beginner	Q2	13.00642	7.693349	129.9823965	389.9471895					
34	77 Beginner	Q3	14.86448	7.24366	138.0517597	414.1552792					
35	78 Beginner	Q3	14.86448	7.290545	137.1639579	411.4918736					
36	79 Beginner	Q3	14.86448	7.33713	136.2930658	408.8792003					
37	80 Beginner	Q3	14.86448	7.383422	135.4385564	406.3156691					
38	81 Beginner	Q3	14.86448	7.429436	134.5999196	403.7907684					

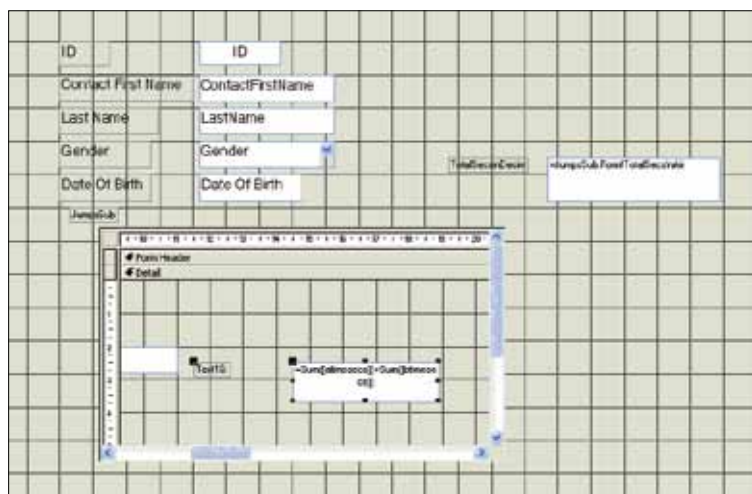
He created a worksheet to hold the new calculations that he imported into a new table in his database.

Pupil E had to recreate the lookups he had used in the spreadsheet. He got some help from his teacher to put in a lookup function.



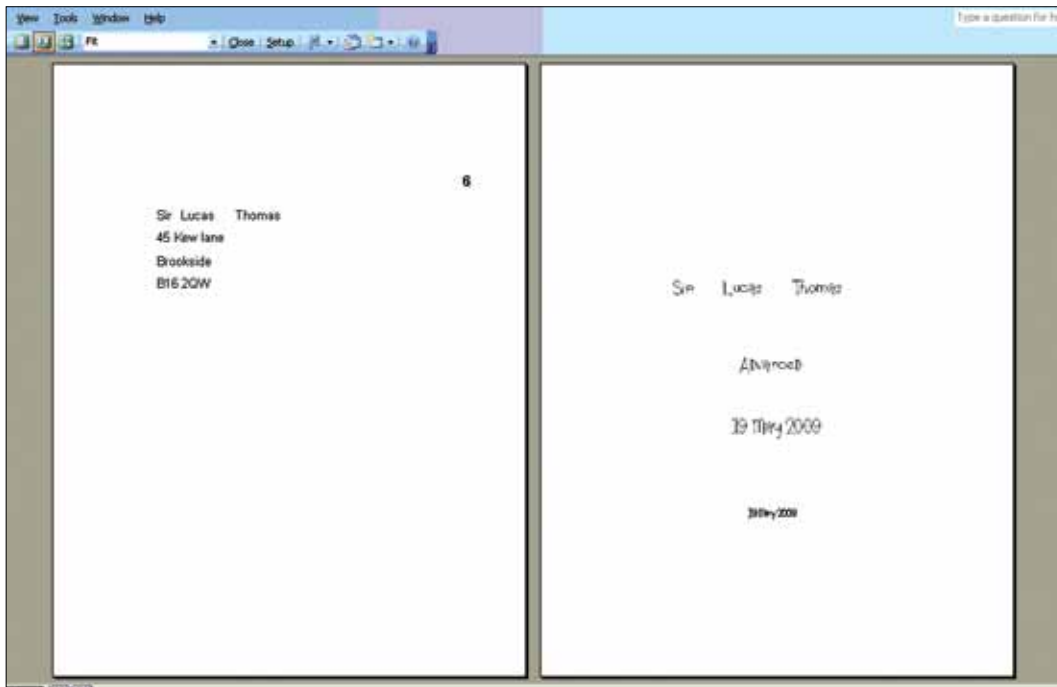
Pupil E had to seek help from his teacher to work out the best way of displaying the data so it would be the most appropriate for the user. He was shown how to use a form and subform that he could then format.

Pupil E was shown how to work out the total time in the air in the subform and he then used this to display the total in the main form for each customer.



Pupil E used the output from his 'TodayJumps' query and decided to output the data into a report so every time someone jumped, they got a certificate on the day. He printed the address on the back of each certificate in case there were any problems printing on the day.

'If the printer doesn't work or they run out of ink, they can just print off later and put it in the post. They just have to use the standard A4 envelopes with the address windows because I have put the address on the back. I've lined up the other fields so they print properly on the ready-made certificate.'



Pupil E then improved the customer form interface and added navigation to the forms to take the user through the steps of adding customers, allocating a parachute and printing certificates.

The screenshot shows a web form for 'The Jumper' and 'The Emergency Contact' sections. The 'The Jumper' section includes fields for Title (Mr), Contact First Name (John), Last Name (Jones), Date Of Birth (11/04/1964), Gender (Male), Contact Number (01234567890), Address: line 1 (3 Queenside), Address: Town/City (Ham), and Address: Postcode (TW10 9RT). The 'The Emergency Contact' section includes fields for Emergency Contact Name (Laura), Emergency Contact address line 1 (64 Crescent lane), Emergency Contact Town/City (Richmond), Emergency Contact Postcode (TW10 9RT), and Emergency Contact Phone Number (01234567890). The 'The Doctor' section includes fields for Dr. Heesh, Doctors Surgery (Whale surgery), and Doctors Telephone Number (02002000200). On the right side, there are navigation buttons: 'Add New Customer', 'Find: Gibson', 'Go Back', and 'Allocate Parachute'. A red banner at the bottom reads: 'Remind Jumper to: Check with your doctor first if you have a history of neck/back/heart problems, or if they are on any prescription drugs. They must not be under the influence of alcohol or non-prescription drugs.'

The screenshot shows a web form with three navigation buttons: 'Customer Records', 'Calculate Parachute', and 'Print Today's Certificates'. The 'Calculate Parachute' button is highlighted. The 'Print Today's Certificates' button is also visible. The 'Enjoy the Ride' logo is present. The 'XS KIES' logo is also visible.

Pupil E tested and refined his work as it developed, responding to end-user feedback. He was also able to recognise areas for improvement.

'The system needs to meet the needs of the end-user, otherwise it is no good. My end-user is very happy with what I have done because it matches what they asked for:

- *the system works out time in the air*
- *there is one place for all the customer data so it can be kept secure and is easily maintained to comply with the requirements of the Data Protection Act*
- *repeat business will be generated by the certificates, which are printed out accurately and look professional*
- *there is only one place from which all parts of the system can be launched – this is very convenient for the end-user.*

However, I know there are other changes that I could make if I had more time and skills:

- *The model only works out jump data for someone whose parachute opens automatically when they jump. To work out anything different needs a lot of maths which I don't have at the moment. So I have limited the model to just one part of skydiving.*
- *Doing the certificates for Gold, Silver, Bronze works very well. Although I did do a query for total time spent in the air, I didn't use this in the certificates because it would be better to convert it into hours, minutes and seconds and I don't know how to do that in the database.'*

Teacher commentary

Throughout the development of the system, Pupil E used testing and success criteria to refine and amend his work. He got detailed feedback from the end-user, using the learning platform, and this helped him decide how the system could be improved.

Pupil E initially used a variety of tools and techniques to solve the problem:

- he used different worksheets to separate the processing from the user interface
- he used custom formatting to make cells containing a numeric value display the units for that value
- he used string concatenation to bring output results together into a single output cell
- lookups were used to determine the correct size of parachute for the weight of a skydiver
- he used extensive data validation to limit the input values in numeric cells to the correct range, and to limit alphanumeric input using drop-down lists
- sheets not intended for use by the user were hidden. The pupil unlocked cells for user input and then protected the sheet to safeguard the formulae
- he created an appropriate user interface using buttons and forms
- he used a range of appropriate field types, including lookups, and he applied validation rules and made use of default values
- he formatted the report fields to print the data accurately onto the certificates.

Pupil E was persistent in his approach to finding out how to achieve the outcomes, using unfamiliar software features, using help files and searching for answers on the internet.

Assessment summary

Pupil E is able to analyse a complex problem and to plan and design an ICT-based system for others to use. Pupil E's spreadsheet model shows how he has worked out the complex relationships between the variables. Pupil E has developed an appropriate corporate image that fully meets the success criteria. He has decided how best to meet the needs of the end-user to generate repeat business.

Pupil E understands what is required of an ICT system to meet end-user needs. He is able to translate what the user wants into a quality solution in terms of ICT. He understands the need for designing systems that minimise user error and appreciates that non-technical people may make use of the system.

Pupil E automates the data flow through the system. The data for a customer is entered once and is used to maintain records, allocate parachutes and print certificates, all within one system. Selected data is displayed on screen and displayed for print. A simple user interface hides the processing from the user.

Pupil E selected the appropriate tools and techniques to create and refine a successful system. Throughout the development of the system, Pupil E used testing and success criteria to refine and amend his work. He got detailed feedback from the end-user, using the learning platform, and this helped him decide how the system could be improved.

Pupil E understands the need to develop an appropriate interface. He has used a range of features to enable efficient data input. His use of validation techniques in the spreadsheet and database demonstrates that he understands the need for reliable and consistent data in the system. The display of the resulting output is presented appropriately, suiting the purpose and audience. His overall solution shows that his thinking has moved on from making the solution work to making the solution work for an unfamiliar end-user.

Although Pupil E needs to demonstrate evidence to explain the impact of ICT on social, economic, ethical and moral issues, his work on developing an integrated ICT-based system places him at a secure level 8.

Next steps

To make further progress the pupil will need opportunities to:

- explain the implications of his ICT system for a company such as XtremeSkies; including legal, privacy, social and ethical issues
- design, implement and document an ICT system for a user in a different context.

Assessment criteria: ICT

	AF1 - Planning, developing and evaluating	AF2 - Handling data, sequencing instructions and modelling	AF3 - Finding, using and communicating information
Level 8	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Design and implement integrated ICT based systems for others to use which: <ul style="list-style-type: none"> meet the needs of the user take account of ease of use collect, process and prepare information for processing efficiently automate dataflow through the system include an appropriate interface between the system and the user use appropriate ICT tools and techniques integrate evaluation into the development process to inform subsequent refinements Explain the impacts of ICT on social, economic, ethical and moral issues 		
Level 7	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Design and plan an ICT-based system by: <ul style="list-style-type: none"> scoping the information flow through the system devising and applying success criteria to ensure a quality solution, refining work as it progresses identifying the advantages and limitations of the system Identify the impact of ICT on people, communities and cultures 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Select appropriate tools and techniques to implement an ICT based system in which: <ul style="list-style-type: none"> data flow is automated sequences of instructions are developed, tested and refined assumptions, variables and rules are identified 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Develop an appropriate user interface for an ICT based system which: <ul style="list-style-type: none"> enables efficient data input displays system outcomes that are fit for purpose and audience
Level 6	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Plan and develop solutions which show efficiency and integration of ICT tools and techniques Use criteria and feedback to improve the effectiveness and efficiency of solutions Explore the impacts of the use of ICT in work, leisure and home 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Devise a data handling solution to test hypotheses that uses techniques to reduce input errors Create efficient sequences of instructions including the use of subroutines Test predictions by varying rules in models and assess the validity of the conclusions 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Use complex lines of enquiry efficiently to interrogate information Explain choices when presenting information for different purposes and wider or remote audiences
Level 5	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Plan and develop structured solutions to problems which use a combination of ICT tools and techniques Use criteria to evaluate the quality of solutions, identifying improvements and refining their work Identify benefits and limitations of using ICT both inside and outside school 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Use logical and appropriate structures to organise and process data Create precise and accurate sequences of instructions Change variables within models and explain the impact 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Take account of accuracy and potential bias when searching for and selecting information Present information in a range of forms for specific purposes and familiar audiences Use ICT safely and responsibly
Level 4	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Plan and implement solutions that combine and refine different forms of information Evaluate the quality and success of their solutions Explain how and why the use of ICT varies in and out of school 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Organise and process data for a purpose Devise and refine sequences of instructions. Use models to explore relationships between inputs and outputs and explain how the models work 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Use appropriate search criteria to find relevant information, and check its plausibility and usefulness Present information in different forms suited to purpose Use ICT to communicate and collaborate, identifying some of the risks and acting to minimise them
Level 3	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Plan how they will use ICT to solve a problem Comment on success of their solution Refine and develop information using ICT tools and techniques to make changes Describe how they use ICT at school and how it is used outside school 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Collect, store and retrieve data Use a sequence of instructions to control events Use ICT-based models or simulations to answer questions 	<p>Across a range of contexts pupils:</p> <ul style="list-style-type: none"> Identify and select appropriate information using straightforward lines of enquiry Present information using text, images and other media Use digital communication to exchange ideas Identify ways they can keep themselves safe when using ICT

Acknowledgements

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