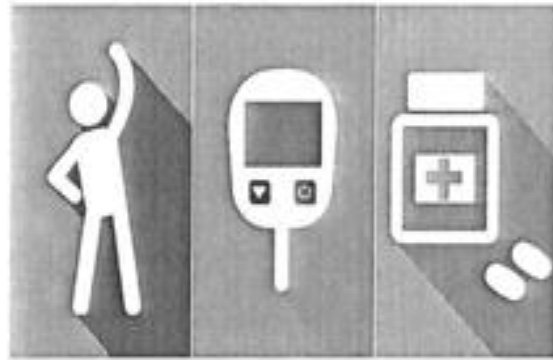


Science candidate evidence



Diabetes: A Life Without Limits

Science Baccalaureate

Science: Interdisciplinary Project

Proposal

Candidate name									
SCN									
Centre name									
Assessor name									
Project title	Diabetes: A Life Without Limits								
<p>Project outline</p> <p>I plan to look into the condition, diabetes, and the use of medical devices to analyse blood glucose levels enabling individuals to control their blood glucose levels accurately and effectively. I will also look into the protocols that must be followed in the manufacturing of these test strips. This will include investigating: what diabetes is, how low/high levels impact the body and how certain drugs have an effect on controlling blood glucose levels.</p> <p>The chemistry aspect of my investigation will come from examining the chemical reaction that takes place within the test strips used in the medical devices. I will use my prior knowledge of chemistry and biology to research the reaction that takes place. I will investigate how medical devices can be used to alleviate the daily struggles of a diabetic patient.</p> <p>I will create a presentation which will be delivered to a younger year (S3) biology class; this will be used to inform them of the biological aspects behind diabetes and will including talking to them about the causes and effects of low/high blood glucose levels. By introducing the topic of diabetes to the young years I hope to show them a practical application of the biology they are currently learning in a class environment, which will hopefully open their eyes to careers directly related to what they are learning now. I will present this in an interactive and engaging way which will help them to appreciate the daily challenges of living with a long-term condition.</p>									
<p>Reasons for choosing this project</p> <p>I have the chosen this topic because I have an interest in the medical device and pharmaceutical industry. I am hoping to study medicine at university which ties in with my project as I will be investigating the affects the disease has on the body and ways in which the industries are finding ways to enhance a diabetics life, making it easier for them to control their blood glucose levels; this proves its relevance to society.</p> <p>This project topic directly ties in with biology and chemistry which are two subjects, which I have particularly enjoyed studying, and will continue to study in my final year at school and into further education. I am currently studying these subjects at advanced higher level which will contribute to my understanding of the topic. My aim is to inspire the next generation to appreciate the practical application of a subject that they have chosen this year, creating an</p>									

awareness of what diabetes is and hopefully increasing their knowledge of the role the medical device and pharmaceutical industries play in improving the day to day lives of the many individuals with diabetes.

The broad contexts this project will cover

My project will be relevant to the context of citizenship as it is directly involved in the health and wellbeing of people living with diabetes and how companies are working to alleviate the struggles the patients must face on a daily basis.

This project will also fit into the topic of economic development as this is also a commercial company-based idea which is working to ultimately make a product that can be sold worldwide, proving its links on a large-scale range. The project investigates how these products are manufactured, in terms of getting the most from the materials made to generate a viable financial reward for the company, but also ensuring that the medical devices are serving their purposes as a reliable and beneficial product in the marketplace. Being able to achieve this balance is something that I will explore when visiting a local diabetes clinic later in the year.

Learning environments, I will access

I will make links to different disciplinary teams within Lifescan Scotland, based in Inverness. I am hoping to contact the Research and Development group within the company and speak to chemists/scientists directly involved in the manufacturing of the test strips.

Clinical Affairs is another team I wish to contact to further my knowledge of clinical trials, protocols, ethics approvals, trial monitoring etc.

A visit to the manufacturing site will also give me a better understanding of how glucose test strips are made and the materials used.

The Highland Diabetes Institute will be another learning environment as it will allow me contact with real patients in a clinical setting, providing the important link between the medical and scientific aspects of this investigation.

I will also use my prior biology and chemistry knowledge, as well as online resources, to research in more depth the complications of diabetes and what measures are being taken to combat and make life easier for people with diabetes.

Another learning environment I will use are STEM ambassadors who will help with my interactive activities and resources to be used for my presentation.

I am also going to arrange a meeting with a local GP practice where I will be able to observe a variety of clinics within the practice and give me a chance to broaden my knowledge of how multidisciplinary teams work to contribute to the holistic care of a patient. This will increase my awareness of the many people involved who work to enhance the life of a patient with a chronic condition.

Internet Research is a method of learning that I will also rely quite heavily upon throughout my project and this will not only help me to find contact details, but also provide me with some more

general background information about the condition itself.

How I will use my knowledge of science/technology

I will use my chemistry knowledge in my investigation when researching the chemical reactions that take place in the test strips, this will help me to understand the purpose, effectiveness and why medical devices are necessary. I can also use this knowledge to identify what it is about the medication given to a diabetic that helps control their levels of glucose.

I will use my biology knowledge to understand how diabetes affects the body, the impacts of low/high blood glucose levels, how drugs affect the body and the differences between Type 1 and Type 2 diabetes. I can add to my knowledge of both underlying biology and chemistry throughout the project as I continue to study both these subjects at advanced higher level. I will also continue with independent research to add to my repertoire of knowledge and expand on what I already know.

From higher human biology last year, I understand the basic knowledge behind the disease diabetes, which includes information about the function of organs such as the liver and the pancreas and the secretion of hormones (glucagon and insulin) used to decrease/increase blood glucose levels; this will help in my understanding of why this process cannot occur in someone living with diabetes. I can also explain the difference between the two key types of diabetes which will help in my understanding of the disease. By already having baseline knowledge about this topic and a basic understanding of the condition itself this will make it much easier when presenting to the S3 pupils. I aim to challenge myself throughout this process by investigating in depth, the more technological side to monitoring and treating a patient; this is a new area of learning that I intend to pursue throughout my project. This information will come from meeting with specialists and observing clinics prior to presenting this information to the younger year group.

The skills I will develop and/or improve in the course of this project are:

◆ *application of subject knowledge and understanding*

I feel that my application of subject knowledge and understanding is a strength, but my project will help enhance these skills by allowing me to apply prior knowledge learned in another subject instead of solely relying on research for information. I feel I can continue to improve on this by building ideas into more meaningful and realistic contexts which will help me to appreciate what sub topic my project fits into (i.e. citizenship and economic development). In doing so I will be able to see a clearer link between scientific experimentation and how this is used to create products in the market.

◆ *research skills — analysis and evaluation*

Research skills can be challenging; however, I am good at planning and adhering to tight deadlines. My project will ensure that I put into practice my analysis and evaluation skills by assessing what I have completed after each period. By managing my time well, I will be able to provide myself with a detailed plan of what am I going to do and exactly when I am going

to do it. This will improve by continually monitoring my progress and setting realistic targets, to ensure constant and steady progression. I will also consider minimising any potential barriers to the success of my project, in order to limit delays and which would prevent me from sticking to a schedule. I would say that research skills are a strength for me however I would like to continue developing these skills which will be put into practice a lot during my project.

◆ *interpersonal skills — negotiation and collaboration*

I find it easy to communicate and negotiate with others, although I prefer to work as an individual. These interpersonal skills can be improved by taking into account different approaches to learning throughout my project. I am confident at asking questions in class, but I sometimes lack positive self-belief. My project will hopefully help me to develop this as I become more engaged and confident in the work I produce, thus making it easier to deliver presentations and ask questions when I need support. I will take into consideration other people's views and opinions which will improve my project as a whole. Feedback will be very important to me throughout my project and I will learn to take on board criticism as well as praise to improve my presentation and make it better suited to my target audience.

◆ *planning: time, resource and information management*

Planning is a strength as I have always been organised in my studies; my project will help me to develop this further by encouraging time management and prioritisation. I will constantly make aims and targets to ensure I stick to a schedule. This will be achieved by creating a diary and a log of daily progress, which I can refer to at any time. Continuous monitoring of my performance will enable completion of each task. I will create a Gantt chart which I will be continuously updating to ensure I stay on track and meet my deadlines. I will also include all other commitments within and out with school on my Gantt chart to help me understand where I have time to fit planning and preparation for my Science Baccalaureate around the other things I enjoy doing. I have considered some of the problems that I may face and ways of managing situations that may arise.

◆ *independent learning — autonomy and challenge in own learning*

I do like to challenge myself and I enjoy independent learning. My project will help me to refine these skills as it is a self-led project and I have the motivation to push myself to make my project successful. I will take the responsibility of making links with companies and not rely on others to carry this out for me; this will improve my independence as I will be taking the initiative to make contacts myself. I will take on all opportunities given to me in order to broaden my knowledge and give me a greater understanding of how inter-disciplinary teams within a company operate. It will also improve my confidence and ability to communicate effectively with others to gather as much information as possible. This project will really aid my ability to have greater independence and feel proud of what I have achieved.

◆ *problem solving — critical thinking: logical and creative approaches*

This is a weakness for me; I am not a very creative person and I struggle to think up creative and innovative ideas. My problem-solving skills will gradually improve as the project progresses as any problems encountered will have to be overcome, allowing me to put into practice these skills in order to proceed with the project. I will constantly generate more ideas which will contribute to my project and stimulate creative thinking by taking me out of my comfort zone and critically analysing approaches to combat issues I may face. I look

forward to the challenge of creating a fun, engaging and interesting presentation to the younger year group.

- ◆ *presentation skills*
 Presenting to a group of people can be daunting, however this will develop over time as I practice these skills, allowing me to feel more at ease when speaking to a large group. I have considered my target audience carefully as I will be presenting to an age group who are currently learning information that is based on my topic. I hope to present my project in a clear and straightforward manner in order to suit my audience. I will only include the relevant information and not over complicate and confuse the students by going into too much depth and detail. All aspects of my presentation, including the layout and structure, will be analysed to ensure it is appropriate to the age group. I will create a powerpoint filled with pictures and have regular breaks for interactive activities to avoid tedium and lack of concentration from the group.
- ◆ *self-evaluation — recognition of own skills development and future areas for development)*
 I do like to receive feedback on my work as I find this very useful to reflect upon what I need to change and what works well from another person's perspective. I am able to look back on experiences to determine possible flaws in my ideas and also very willing to take into account different opinions and solutions to get around a problem. These skills will be put into practise when I come across difficulties in my project, allowing me to adapt my project to be the best I can make it. I will continually ask for feedback from my peers and teacher as well as feedback from the companies I make contact with. I will improve on these skills by using data from a diary log which will allow me to improve and make better judgements in future decision-making processes. I will learn to deal positively with all aspects of feedback such as praise, setbacks and criticism.

Assessor feedback to candidate			
<p>You have formulated a project which has considerable depth and the potential for great challenge which is excellent. You have a clear vision for bringing a number of different strands together and have clearly considered who will benefit from the presentation of your project. Your current learning environments are slightly limited in number and range; I would like to see you improve these further. Your skills analysis is balanced as well as detailed. I would like to see you consider further how you may be able to use feedback in different forms and from different sources to ensure that you are progressing to your full potential.</p>			
Proposal approved	Approved	Further work required	
Candidate signature		Date	24/10/18
Assessor signature		Date	24/10/18

Science: Interdisciplinary Project

Plan

Candidate name											
SCN											
Centre name											
Assessor name											
Project title	Diabetes: A Life Without Limits										
Is this a group project?	yes	<input type="checkbox"/>	no	<input checked="" type="checkbox"/>							
If a group project my individual role or responsibilities will be:											
<p>Timescales</p> <p>I will organise my time with the use of Gantt charts which I have already prepared and will continue to add to over the course of the year. This will help me to recognise when to put time aside to prepare for the presentation of my project, alongside prioritising study time for my subjects required for university. I also have many extra – curricular activities which I compete in and are also just as important to me, which I wish to maintain throughout this academic year and the Science Baccalaureate process. I have recorded in my Gantt chart all the deadlines required for my subjects and for the Science Baccalaureate which will aid me in identifying how many weeks preparation I have before a deadline is due. I think this will be an effective means of sticking to and setting targets for myself which I know will be very important by the time prelims are my main focus. I am also aware that my most busy period will be around Christmas (due to prelims) and April/May time due to exams, therefore I plan to achieve as many milestones as possible during the Pre-Christmas term eg. visit to a diabetes clinic (17/10/2018), initiate company contacts. This will diminish some of the pressures surrounding the busiest times. Making lists is also a way that I find works well for me and will also aid me in organising my time effectively.</p>											
<p>Planning</p> <ul style="list-style-type: none"> To start to my investigation, I will conduct some basic research into the condition and the corresponding biological aspects. This will include looking into how the body works in controlling blood glucose levels (hormones, liver and pancreas functions in this process) as well as the causes and prevention of diabetes and treatments utilised. I will also investigate the difference between the two key types of diabetes and understand why certain age groups and lifestyle factors (Type 2 only) can impact an individual's susceptibility to the condition. 											

- After this I will explore the disease statistics, specifically looking at the number of people who have the condition in the local area as well as its prevalence countrywide. I hope to gain useful information from visiting a local medical practise (Moray Coast Medical Practice in Lossiemouth) giving insight to the communication and relationship healthcare professionals have with their patients, which are key in the treatment of an individual. By broadening my own knowledge of the condition, it will make the information I present at the end of my project far more in depth and accurate, ultimately resulting in a better presentation of my findings.
- Visiting the Highland Diabetes Institute in Inverness will give me greater awareness of what technological developments are being implemented to enhance the life of a diabetic. By talking to professionals, such as nurses, research and development, and clinical affairs teams, I will be able to improve my knowledge of clinical trials and how these support the approval of products sold on a worldwide scale. I have organised to sit in on a clinical study being conducted at the diabetes clinic, where I will be able to observe the cross-over between the technological and personal, patient aspects of the disease.
- I will also be contacting Members of the Research & Development and Clinical Affairs teams at Lifescan, where I will be able to observe and talk to research staff who carry out testing and diabetic subjects attending the clinics. This will give me an insight to the practicalities of clinical trials, the human side to the condition and also knowledge of the chemical reactions that occur when the test strips are used. It will be interesting to see how new clinical trials support the development of new products.
- My presentation will include an interactive activity– this will entail a sugar and fat match up activity in which the pupils will be asked to match up the different volumes of fats and sugars to common snacks that they would buy. This will be used to show the pupils the risks associated with eating some of these common snacks and how prolonged eating of sugary and fatty foods can impact their lives. This is designed to show the students the importance of a good balanced diet and how diabetes can be associated with poor lifestyle choices. For this I will be contacting STEM ambassadors who will be able to provide guidance for with the activity I plan to carry out and illustrate the valuable relationship between education and industry. These ambassadors are experienced at giving educational presentations and I hope to get some helpful tips into engaging and providing an activity for my audience, whilst educating them at the same time.
- Another practical demonstration I will carry out with the class is the use of glucose test strips and meters, borrowed from Lifescan Scotland. Students will be able to 'play' with the meters and strips and obtain a glucose reading using control (sugar) solution, this will simulate how the test would be performed using blood.
- I also plan to practice my presentation regularly to my class and with my teacher as an audience, which will not only boost my confidence but will help me gather useful feedback which I will use to improve my presentation skills. I will also look to present my findings to people who are experienced in the subject of diabetes (i.e. contacts within Lifescan). This will also ensure that all my information is accurate and up to date.

Resources

I will be visiting the Highland Diabetes Institute in the first week of the October holidays which will give me some insight into the patient contact aspect to diabetes management rather than just the commercial technological development of medical devices. Here I will spend time in the clinic observing the diabetes professionals as they work with the patients and hearing the discussion as to what further steps are being taken to ensure the individual is receiving the best possible treatment and how they can make positive lifestyle choices to aid management of their condition. I will specifically observe the relationship between the patient and their health care professional and this will hopefully show me why it is so important to maintain strong trusting relationships with those around you when dealing with a lifelong condition.

I will also be meeting with The Research & Development and Clinical Affairs teams from Lifescan Scotland during the second week of the October holidays. During development of new products their clinics, based in Inverness, Edinburgh, Birmingham and Germany, provide valuable insight into how new products will perform in the hands of the user. A visit to the Inverness clinic will increase my knowledge of new trials that are currently being conducted. From this I will learn about the randomisation processes used in a clinical environment and the different uses of technology that have been designed to test the accuracy, validity and reliability of the test strips and meters that companies are manufacturing. From this experience I will also get an overview of clinical trials and ask questions regarding sample sizes and how specific pieces of technology are used to accurately detect changes in the blood glucose levels. My time at Lifescan should provide me with sufficient and very relevant information regarding the economic development factor of producing test strips and statistical analyses surrounding their use. I will ask members of the Research & Development and Clinical Affairs team if I can borrow some of their products to use in my presentation.

I will also contact a local Health Centre to acquire more information about the prevalence of the disease in the community. Here I can use knowledge from healthcare professionals, including the statistics surrounding the number of people actually affected by the condition. I also plan to ask them what kind of advice is given to these individuals, including lifestyle modification techniques as well as medications such as insulin and steroid injections.

Another resource that I will be using are STEM ambassadors who are involved in the educational aspect of my project. It will be good to speak to them and ask them what methods they use to capture their audience's attention and keep younger students engaged. I will be asking to borrow materials such as the "how much fat and sugar in common foods" activity to use in my presentation.

Research methods

I will contact companies such as Lifescan Scotland, The Highland Diabetes Institute, Local Health Centres within the NHS and STEM ambassadors to aid my research. By talking to diabetic nurses and other health care professionals, who have good relationships with their patients, I will be able to see the more personal side to the condition. This will entail face to face interviews, however, if I am unable to find an appropriate time to meet them in person or if this is not practical, I can have a phone call conversation to collect information. I will also use my prior and current knowledge from my two advanced higher science subjects that I am taking this year

and the higher human biology and chemistry which I enjoyed studying last year. With use of online resources and books from the school/local library, I will be able to gain as much information as I require about the condition to use for my project.

I will also contact a local GP medical practice to gather some statistics on the how broadly it affects people in our local community which will give me a better idea of how large scale a problem it is in our society. I will also use email to contact my resources.

Within the NHS I am hoping to contact a diabetes specialist team based in Raigmore Hospital in Inverness. I will contact these individuals via email in order to discuss an appropriate time to meet and gather research. Ultimately, I plan to gather my research through face to face interviews where I will ask specific questions regarding the treatment and care provided to patients. This will provide a range of methods to make contact with different organisational bodies.

Another contact I will make is with the STEM ambassadors which will provide a good link between industry and education. If a face to face interview is not possible then I will discuss with individuals through phone calls or email.

Presentation

Who do I think will benefit from listening/reading/looking at my presentation of my project findings/product?

I plan to present my findings to an S3 class who are currently studying biology. As a part of the diabetes aspect of their course, they won't yet have an in-depth knowledge of the condition, so I hope to broaden their understanding of the disease and open their eyes to what it is like to live with a lifelong condition. I have looked into their course content to ensure that my project ties in with what they are currently learning.

My target audience is suitable as I am providing this year group with information that they have not come across before (and will be covering soon after) so they will definitely benefit from this initial introduction. This will also tie in with their studies by giving them a greater background knowledge into one of the topics covered on the course. This will give them a realistic impression of a practical application of biology and how this knowledge can aid the development of glucose test strips and medical devices which have the potential to not only enhance a diabetics life but to save their lives.

It will also give them a better idea of future career options with their biology knowledge, not necessarily directly involved in the treatment of the patients, but still make a valuable contribution to research, manufacture and development of products designed for use by patients. I want to make them aware that there are many supporting roles such as medical devices and the pharmaceutical industry that equally contribute to the care of patients. I hope to show the students how much research and development goes into making such a small and insignificant looking strip that can save lives.

<p>What methods are appropriate to my audience(s)?</p> <p>I am going to give an oral presentation to my audience as I feel this is the most engaging method of teaching and learning. I will use lots of visual aids such as pictures, videos and models of glucose test strips and meters. I am also looking to include a couple of interactive activities as explained in the planning section above, which will get them out of their seats and feel greater involvement in the presentation.</p> <p>When presenting to a younger year group it is important that I make it as engaging and interesting as possible to avoid tedium and distractions throughout my presentation. Therefore, an oral presentation interspersed with interactive activities is the most appropriate method to get the information across to my audience and hopefully make it interesting, fun and engaging. I will also have a powerpoint which will have lots of pictures and limited writing so they are not just reading off slides, but are fully engaged in what I am presenting. The pictures and models will give them a visual representation of what I am talking to them about, which will enhance their learning.</p> <p>Prior to presenting to this class I will practice both the presentation and the activity with my Science Baccalaureate class to check its suitability. I will also practice with a small group of third year pupils to check if the language and terms are familiar to them to ensure it is an appropriate level of learning for them.</p>	
<p>Dependencies</p> <p>I will have to depend on other people from different companies to return my calls and emails which could ultimately end up as an issue as I need to rely upon them to answer any questions that I may have.</p> <p>My presentation is also reliant on being able to find an appropriate time to present my project to one of the younger year groups which I will need to discuss with the teacher of their class to see if this is appropriate to take time out of their teaching time for my presentation to occur. I am also reliant on companies having the time or allowing me to gain access to their clinics due to patient confidentiality.</p>	
<p>Contingencies</p>	
<p>Any anticipated problems</p> <p>Not being able to arrange a mutually suitable time to talk to with a company representative.</p> <p>Not being able to put enough time aside for my project with upcoming exams which are of greater priority and other extra – curricular activities.</p> <p>Losing motivation to complete the project with increased workload from other subjects could</p>	<p>My plans for overcoming the anticipated problems</p> <p>I will have back up companies and use other means of resources such as my own personal research to aid my project.</p> <p>I will need to organise my time effectively by making good use of my Gantt chart which will allow me to identify when I have time to put aside for my project. I will also make plans to prioritise and use my time more effectively and set aside specific times each week to spend on</p>

<p>potentially be an issue that I will need to overcome.</p>	<p>each individual subject and for my Baccalaureate project. By visiting different clinics and talking to lots of different people this will hopefully increase my interest and motivation, therefore I plan to include plenty of practical research rather than solely using internet-based research.</p>		
<p>Method for recording my skills development and future areas for improvement At the start of this project I completed a skills audit which will acts as a baseline for me to look back on and refer to at any time, giving me a clear initial competency level. I will continually record my skills development throughout the process by reflecting on specific experiences such as the visit to the diabetes clinic where I wish to develop my confidence skills. I will do this by creating a diary log which will be filled out weekly. By keeping a log, I will be able to easily see progression in certain aspects of my skill repertoire however it will also indicate where I need to improve.</p> <p>Within my diary log I will use others feedback and opinions to self-evaluate creating 'two stars and a wish.' This will directly show where I need to improve and what aspects I have already improved proving an effective method of monitoring my performance. I will carry out a second skills audit in the middle and a third at the end of my project to show progression over the period of time spent studying this project.</p>			
<p>Assessor feedback to candidate</p> <p>This is a really engaging and current topic which will no doubt support your progress into studying Medicine. You are ambitious in bringing together many areas of research into one project and have clearly made use of appropriate planning to ensure that this will be carried out successfully.</p> <p>Well done I look forward to seeing your project come together!</p>			
<p>Plan approved</p>	<p>Approved</p>	<p>Further work required</p>	
<p>Candidate signature</p>		<p>Date</p>	<p>14/12/18</p>
<p>Assessor signature</p>		<p>Date</p>	<p>14/12/18</p>

Science: Interdisciplinary Project

Presentation of project findings/product

Candidate name										
SCN										
Centre name										
Assessor name										
Project title	Diabetes: A Life Without Limits									
How I presented my project findings										
<p>Before I presented my final project to the third-year students, I received feedback from various people. Initially I presented to class peers where we critically analysed and provided feedback via a “two stars and a wish” method.</p> <p>I then presented to a small group of third year biology pupils, to determine whether it was an appropriate level of learning for their age group. This included whether or not they understood some of the specific terms and language used. I asked them to provide feedback by giving them a list of 5 questions to answer about the presentation they had just taken part in: What did you enjoy most about the presentation? Was it an appropriate level of knowledge for you? Did I present it clearly with good tempo, tone and volume? What areas of my presentation need improvement? Do you feel the interactive activities contributed well to my presentation? I received a very good mix of comments which I used to improve my presentation.</p> <p>The main criticism I received was my use of cue cards and I frequently increased the speed at which I talked. This was initially due to nerves, however with regular practice of my presentation to my peers and family members I learnt to relax and slow down to concentrate more on what I was saying and not relying heavily on my cue cards.</p> <p>Finally, I presented to my teacher to receive more feedback. I gained a balanced range of both positive and negative comments. One part of my presentation that needed development was the section about the chemical reaction that takes place in the test strips. This was a more complicated section which I was worried about presenting to the students due to its complexity. Initially I included all the names of specific chemicals and enzymes involved in the chemical reaction. However, after reconsidering what I was going to say I simplified the terminology and removed some of the specific terms to make it much easier to understand. This was something that I feel really benefitted my presentation.</p> <p>I presented my project in the form of a powerpoint to a class of third year biology pupils. I chose to present to this age group as the next unit of their biology course includes looking</p>										

into conditions such as diabetes.

The feedback provided from both my teacher, peers and the students proved that my interactive activities were something that they really enjoyed and contributed well to the presentation.

To begin my presentation, I included some of the statistics I had obtained from visiting Moray Coast Medical Practice regarding the number of people who are affected by the condition in the local area and further afield. I also emphasised the dramatic increase in the number of individuals diagnosed with diabetes from 1980 to current years, which has been linked to an increase in obesity. One of the specialists also explained to me how prevalent Type 2 diabetes is becoming in children, which is particularly surprising as in the past it has been labelled as an adulthood condition. This is an aspect that I really wanted to highlight to the pupils.

The powerpoint was used to keep the students interested and gave them a visual representation of what I was talking about. During my presentation I used diagrams on the slides to explain some of the more complicated themes which made them much easier to understand. In my presentation I included interactive activities to keep my audience engaged which I feel were very effective due to the age group I was presenting to.

My first activity was provided to me by a STEM ambassador, who I contacted earlier in the year. This was used to get the pupils to gauge the sugar and fat content in unhealthy foods and then comparing the contents in these foods to the maximum daily averages. This was a good way to demonstrate the true extent of how bad some foods really are for them, and I used this to validate the point I made about how careful we, as non-diabetics, have to be when choosing what we eat, but for a diabetic this could be the difference between life and death.

I included a section in my presentation about the effects of Low and high blood glucose levels (hypoglycemia and Hyperglycemia) this information was taken from talking to specialists from the Highland Diabetes institute. When discussing with the team I gained valuable insight into the detrimental impacts raised or low blood glucose levels can have on the body.

The next part of my presentation explored the use of medical devices and test strips to monitor a diabetics blood glucose level. For this I used samples of the meters and strips that are manufactured locally by the company Lifescan. I gave each group a diabetes monitoring pack, which contained test strips, meters and control solution, to give them a chance to try out the meters and get readings using the control glucose solutions. I explained to them the chemical reaction that takes place within the test strips and how this works to give them a reading on the meter. I feel these interactive activities contributed well to my presentation and gave me a chance to talk to each group individually and answer any questions they had about the tasks set. It also made the presentation a lot more personal, which is something that I feel was addressed well with the use of the products I received from Lifescan and STEM ambassadors.

<p>I feel the presentation went well as there was a good balance between formal presentation and activities to keep them focussed. I thought carefully about when I interspersed the activities, for example I alternated between information and then followed it by an activity. This was effective as I didn't overload them with too much information at one time and allowed them to digest what I had just told them and practically apply it to the activity. When carrying out each activity I made sure to go round each table and explain a bit more about what they were doing and how a diabetic would use the equipment in the same way. I also individually gave each group a small demonstration of how the strips actually work by taking apart some of the test strips and showing them the components within the strip and the purpose of each part. I think this went well as it was more personal and allowed them to ask questions in front of a small group of classmates and not the whole class. It also gave me a chance to explain more in depth some parts that weren't directly included in the presentation.</p> <p>One part of my presentation I struggled with most was trying to regain their focus after carrying out a practical activity with them as they were engrossed in the activity and I was ready to move on. Maintaining authority to get back on track is something that will come with experience. If I was to do the presentation again, I would consider taking in all the models, rather than leaving them on their desks to limit any distractions. This would have introduced the next part of the presentation better and allowed them to regain concentration.</p>			
<p>Assessor feedback to candidate You spoke clearly and concisely during your presentation and lessened your reliance on cue cards which made your voice more natural and engaging. I'd glad to see you took on board feedback and made changes to both your layout and explanation of some of the more complex terminology such as the chemistry behind how glucose meters work. These made the learning more logical and accessible for your S3 audience. You had a great practical activity which pupils really engaged in and you circulated well around the class, dealing with any issues and further explaining any points which were raised. Your audience was engaged and interested throughout – well done!!</p>			
Candidate signature		Date	6/3/19
Assessor signature		Date	6/3/19

Science: Interdisciplinary Project

Evaluation of project

Candidate name									
SCN									
Centre name									
Assessor name									
Project title	Diabetes: A Life Without Limits								
How successful has my project been overall?									
<p>The planning aspect of my project started out as a challenge as I struggled to think of a creative idea that I could develop to form my project. It took longer than I anticipated to find something that I felt passionate about and that would maintain my motivation and interest throughout the year. I wanted to be able to research a topic that was engaging and somewhat related to what I want to do at University. I am more of a scientific person rather than creative which is why I found this difficult to achieve at first. However, once I had thought of this topic idea, plans and project designing fell into place. This has definitely improved and I have proven to myself that I am able to produce innovative ideas and concepts. I like having a structured way of learning and designing a Gantt chart was a very effective way for me to manage my time around my other subjects and helped me to set milestones for what I would have liked to achieve by specific dates throughout the year.</p> <p>One strength of my project planning is that I was good at recording what had been completed each week (In the form of a list) which allowed me to see what I still needed to do. I formed a good, very detailed plan of all the things I wanted to do throughout the project at the start of the year. This included all the people that I wanted to get into contact with, the content in my presentation, and how I was going to gather information.</p> <p>One weakness of my plan is that I didn't include any potential challenges that I may have had to overcome, therefore additional time was not allocated to resolve any problems. This was an issue as it forced some of the specific target dates to be pushed back and deadlines were put under greater pressure.</p> <p>I wanted to choose my target audience carefully, which took longer than anticipated as a lot of the information I initially gathered required a high level of prior knowledge. However, I decided that the most beneficial year group to present to was third years as this is the first year that pupils can make informed choices about what subjects they wish to pursue into the senior phase of school. I wanted to demonstrate to them the practical and inspiring applications of science and where this could take them in further education and ultimately future careers.</p>									

During the implementation stage of my project I had to make links with companies in the local area to gather information. I was very lucky in that all of the groups of people I contacted got back to me to arrange dates for me to meet and talk to them. I was also given lots of useful resources by a STEM ambassador who was very willing and happy to provide me with useful tips and products to present. I was able to get in contact with this individual by phone which was very effective as it meant I had an instant reply.

Another strength of my implementation stage is that it made me feel much more confident at speaking to people face to face and through phone calls, which I would have found more nerve wracking and challenging in the past. The ability to communicate effectively with people is a very important skill that I have developed greatly and will give me an advantage in achieving my goal of becoming a doctor.

One learning point that I didn't think to consider was confidentiality which meant that some information could not be shared due to strict rules due to medical ethics. For this reason, I was not able to carry out any research at my more local Health care practice as it is the Health centre that I am registered with, and could breach confidentiality. Although it was not so practical, I was able to overcome this issue by getting in contact with another Health centre who were able to provide me with a week-long experience observing many clinics at the centre and speak to lots of healthcare professionals.

Towards the end of my research stage I began to struggle for time, which is something that I could have planned better for. This meant that some of the research gathered at the end of my project was more rushed, to ensure I was still leaving myself enough time to prepare and practice my presentation. Ultimately this meant that I wasn't able to take up as many opportunities as I hoped, for example, I was offered a tour of a manufacturing facility where glucose test strips are made. Unfortunately, due to the lack of time I wasn't able to take up this valuable opportunity, however, this is something that I would choose to look into in the future.

I think that a strength of my project is that I found the topic very interesting which was very important and was hopefully conveyed when presenting this to the third years. One strength is that I am good at research and therefore felt confident with my level of subject knowledge. I was able to take on all feedback provided to me from a variety of different sources which I used to adapt my presentation and make it better. Feedback I received was from class peers, my teacher and also a smaller group of S3 pupils. This helped to gauge their level of understanding on my topic. This feedback was very useful and meant I had a better idea of how my presentation would be received.

It was highlighted that one aspect of my presentation was quite difficult to understand was the inclusion of complex chemical names and reactions that took place. To overcome this, I removed references to specific molecules and simplified the terminology to make it a more appropriate level of knowledge for my target audience.

A weakness that I had to overcome was my presentation skills as I get really nervous when presenting, which meant that in the initial practices I relied heavily on my cue cards. Although I was still nervous on the day of the presentation, I don't think this was noticeable due to all the

opportunities I had to practice my talk. With the aid of my power point I was able to clearly explain all aspects of my presentation in a way that this age group could understand with little use of my cue cards. This made my presentation flow much better and made it more engaging for my audience as I was able to use more eye contact and slow down the speed I was speaking at.

How effective were my communication methods throughout the project?

My methods of communication were mostly effective as many individuals I contacted responded quickly and were very helpful. The main method I used to communicate and gather information was through email and phone call.

The first company I contacted through email were The Highland Diabetes Institute. They took quite a long time to reply, however I left it for a week and they did reply apologising for the time delay. This wasn't an issue for me as I had plenty of time to hear back, however if this had been at a later stage in my project the time delay may have been significant and I would have considered phoning directly to get a quicker response.

The next company I contacted was Lifescan Scotland's Research & Development and Clinical Affairs team via email, who were very quick to respond and arrange a date to meet to have a face to face discussion and introduce me to the clinic. This was a good experience and really helped to build my confidence, speaking to both the patients and the healthcare professionals. I also used email to communicate with Moray Coast Medical Practice in Lossiemouth, who were also very quick to respond. This proved a very effective method of communication as I was able to contact the Practice Manager directly and she organised a weeks' placement, working with a large variety of healthcare professionals giving me an excellent overview of the healthcare system. It also gave me a good opportunity to have face to face discussions with patients and individuals from different interdisciplinary teams.

Finally, I contacted a STEM ambassador through phone call, this proved very effective as I got an instant reply. He was very helpful and arranged to meet with me to provide me with resources for my powerpoint presentation and helpful tips to improve my presentation skills.

Overall, I would say that my methods of communication and data collection were very effective and I had a large variety of strategies to contact companies and individuals eg. email, face to face, phone calls and online research. I have learnt that the best method of communication is via phone call or face to face interview as I was able to gain lots of insight and valuable information to use in my presentation. I would definitely consider using these methods for any further research.

Is there any aspect of my project that could be taken further? What might my next steps be?

If I was to take my project further, I would consider looking more into the chemical reaction that actually takes place in the test strips and look into the specific enzymes that stimulate the reaction. This would result in a change to my target audience for the presentation to either an advanced higher chemistry or biology class as a greater level of knowledge would be required to understand these concepts.

I would also do more research into the medications that can be used to control blood glucose, and the different types of insulin that can be used in blood glucose control. I would also consider looking into the manufacture of the test strips in companies such as Lifescan Scotland, as I was offered a tour as a follow-up to my initial visit. This is something that I would find particularly interesting and give me a greater insight into some of the other broad contexts such as economic and sustainable development. Overall, I would like to increase the complexity of my project to further challenge my learning.

Candidate signature		Date	13/3/19
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Science: Interdisciplinary Project

Self-evaluation of generic and cognitive skills development

Candidate name									
SCN									
Centre name									
Assessor name									
Project title	Diabetes: A Life Without Limits								

Application of subject knowledge and understanding
<p>My skills audits that were carried out at various stages during the project (initial, middle and final) show dramatic improvements across this area of skills development. The biggest improvement can be seen in building my practical scientific ideas into meaningful and realistic broad contexts. Initially I purely thought of the biological aspect behind diabetes, but since carrying out my research I have been able to see a more personal patient centred aspect of the condition and observe it in a much wider context. This has given me a much broader depth of knowledge as to how a scientific topic can be translated to commercial development and clinical benefits alleviating the challenges and burden the condition has on a diabetic's daily life.</p> <p>My knowledge of science has evidently been used throughout my research and I was able to extract information from both chemistry and biology which were used in the final presentation; such as the biological aspect behind diabetes and the chemical reactions that can be found in the diabetes test strips and meters. My application of scientific knowledge has developed significantly over the period of time that I have been carrying out this Science Baccalaureate. This can be seen from my skills audit, showing an increase from "need more practice" to feeling "competent" and even "highly competent" in some areas of subject application.</p> <p>It was straightforward building ideas into meaningful and realistic contexts, because I was very interested in exploring my chosen topic, however if I had not felt fully engaged with my project choice from the outset it would have been harder to develop and generate ideas to progress the project and maintain my level of interest throughout. This is an area of skills development that I feel would be very useful to progress.</p>

Research skills — analysis and evaluation

Personally, I have always enjoyed research and I would say that this is one of my strengths however this is definitely another aspect that has seen improvement since starting the year. I have managed to dramatically increase my repertoire of choosing methods for research which would initially have been through websites, to taking a trip to a diabetes clinic and talking with a variety of healthcare professionals. I was able to make lots of contacts with individuals from the local company Lifescan who are involved in research & development and manufacture of these test strips that are sold globally. I also developed these skills by reaching out to a group of STEM ambassadors who provided me with some resources which I used in my presentation as a way of engaging the pupils and providing them with a visual representation of some of the products manufactured by Lifescan Scotland. Although I have developed my ability to explore a range of sources throughout this process, I am still looking to broaden my repertoire of research methods by gaining information from a greater variety of sources out with my learning environment and not just limiting myself to individual online research.

I have also learnt from this project that it is okay to return to the research stage as and when it was necessary to gather more information about certain aspects. It still feels like taking a step back but I am beginning to realise that it is just helping me to add to what I already know.

Something that I am still aiming to improve on, is my ability to deal with large volumes of information and be able to condense this down to focus on only the things that matter, as I still find it difficult to find a clear and concise way of presenting all information.

Interpersonal skills — negotiate and collaborate

One of the biggest developments in skill competency over the course of this project would be in my interpersonal skills. Initially I struggled to take on board feedback as I would treat it as a failure in my ability to perform at my best, but I can now see that it is just a stepping stone that I have to achieve in order to move onto the more difficult stages and have learnt to not treat bad feedback as a negative but as something that I can work on and improve. It has also helped me to set targets for myself and use these to motivate myself to continue with steady progression. My confidence has grown massively and I now feel much more competent in asking for help when I need it and using feedback to find ways of resolving situations rather than avoiding them completely.

There are still areas of development that I need to target to improve my interpersonal skills further which can be improved by taking into account different approaches to learning. There were not many aspects of my project work that required me to find significant resolutions to problems, therefore limited opportunities to refine these skills, so there is still room for improvement.

Planning — time, resource and information management

I am generally quite an organised person, particularly with my studies, however at the start I still found it difficult to stick to targets and specific milestones due to the heavy workload and deadlines from my other subjects. However, since this initial point I feel my time management skills are much better due to the creation of a Gantt chart which was used to balance my time for project research around my other subjects, prelims and other extra-curricular activities.

One thing I would have done to improve my project would have been to include any possible barriers that may have occurred so that I was adequately prepared for any eventuality that may occurred. Luckily there were not many problems, although it would have been beneficial to include this in my initial plan to avoid any time delays.

Independent learning — autonomy and challenge in own learning

I often work best as an individual learner and take ownership of tasks to ensure that things happen and that all work is completed and to my best ability. I would say that I am quite self-sufficient and think that the Baccalaureate was a good way to enable me to use these skills, by making links with companies and businesses. This allowed me to establish some new learning environments which really helped me in my presentation. By making these links I was able to gather more information about diabetes test strips and meters and also obtain some of these products for demonstration purpose in my presentation. If I was unable to make any links this would not have been possible; I used my skills responsibly to ensure that I was able to make this happen.

This interdisciplinary project has also pushed me to take on challenges and gain more experiences, such as the work experience at a diabetes clinic in Inverness. I arranged this myself, showing that I have become more efficient at taking the initiative and not relying on other to organise experiences for me. This is something that will definitely benefit me and make me consider opportunities that would aid my skill development in the future.

My presentation was delivered to an S3 class which dictated the level of complexity that I was able to include. I could have challenged myself further by choosing a more advanced target audience and thus creating a more in-depth and scientifically complex talk and materials produced. This would have encouraged me to take a more demanding approach to my learning.

Problem solving — creative approaches; critical thinking; logical approaches

For me this was the area of skill development that I knew I was going to find most difficult as I wouldn't describe myself as a very creative person. Initially I found it very difficult to brainstorm ideas for my project topic however gradually once I finalised my project choice, I started to generate lots of ideas, and tried to incorporate some more interesting way to

present my information to the younger age group. This is the reason I chose to present my project through visual means (i.e. the use of a powerpoint). This compelled me to try something a bit different and something more creative than what I am used to producing. This really helped me to develop a greater range of creative approaches to learning which I feel best suited the age group I chose to present to. My aim was to make my presentation interesting, engaging and informative which I feel was achieved through careful consideration of my target audience and what topic I was presenting.

Presentation skills

I think that my method of presentation was engaging and interesting as introduced a variety of techniques, namely visual representations (powerpoint), verbal discussion and interactive activities.

I considered my target audience carefully, as I chose a group of students who were currently studying biology. To ensure my presentation was at a suitable level I reviewed the course content for third year biology which in later topics did cover the condition of diabetes, therefore this was a good introduction to their future learning.

To ensure it was at an appropriate level it was by introduced to a small group of S3 pupils. I asked these individuals to provide feedback on: whether they thought it was an appropriate level for them, whether they understood all of the information, what aspects of the performance did they enjoy/like, what would they change to make it more interesting/better. This feedback was really useful and played a key role in making adaptations to my final presentation. I think my presentation was well thought out and presented in a logical format, as it started by introducing the condition, preventing or delaying onset of type 2 diabetes, symptoms of low and high blood glucose levels, ways to monitor and control blood glucose levels using medical devices and strips and finally the future of blood glucose monitoring to reduce the burden on people with diabetes.

With so much information, gathered from many different sources, it was often difficult to identify the most relevant facts that I wished to incorporate into my presentation. With experience, this is a skill I wish to improve to ensure future projects are concise and to the point.

Self-evaluation — recognition of own skills development and future areas for development

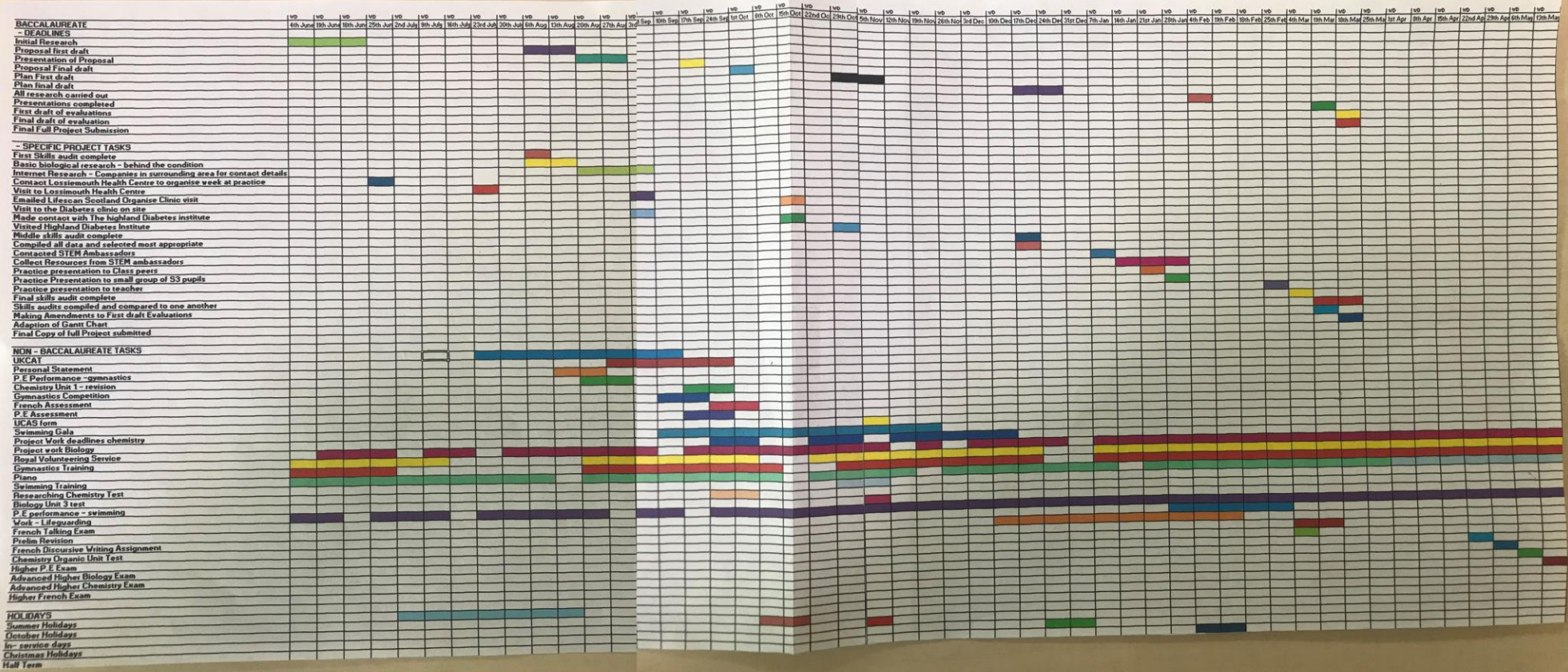
At various stages throughout my interdisciplinary project I asked for feedback, initially on my proposal idea which I presented to S3 pupils, my class peers and my teacher. As time progressed, I was able to respond positively to criticism and not see it as a setback. This feedback has been really useful as there were different opinions and views which contributed to the success of the presentation.

During the year I have had plenty of opportunities to individually present my ideas to a group of people which has allowed me to learn from the experience and engage a class despite the nerves I felt.

Taking the lessons learnt in the classroom setting and translating this to dealing with real live scenarios will be the next step in my self-development.

By undertaking the Science Baccalaureate, I have grown in confidence and my ability to communicate effectively with people has progressed significantly. This will undoubtedly help me in future aspects of my life and prepare me for studying Medicine at university and ultimately becoming a doctor.

Candidate signature		Date	13/3/19
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Science: Interdisciplinary Project

Assessor report

Candidate name:
 Candidate number
 Centre:

Project proposal	Tick as appropriate
Grade C criteria	
The title and aims of the project.	✓
Clear aims and reasoned arguments to support the relevance and practicability of the project.	✓
Identification of opportunities for:	
◆ own skills development	✓
◆ collaborative working	✓
◆ accessing less familiar learning environments	✓
◆ application of science subject knowledge in a broad context	✓
◆ use of knowledge and skills across different disciplines	✓
◆ making connections between subject knowledge and the wider world	✓
Evidence of the ability to communicate clearly and concisely in advocating the proposal.	✓
Grade A criteria, includes all of above plus	
Well conceived proposal which sets creative and challenging goals which are at the same time realistic, achievable and practicable.	✓
Robust and carefully argued justification of the proposal.	✓
Substantial links and understanding of possible connections across disciplines contributing to the project.	✓
Comments	
has developed a relevant proposal with justification not only to health and well-being but also to her prospective career in medicine and a personal interest in pharmaceuticals. Her project has considerable depth and the potential for great challenge. She has a clear vision for bringing a number of different strands together and has clearly considered who will benefit from the presentation of her project. She acknowledges both strengths and weaknesses within her skills development, further evidenced through completion of a skills audit at the start of the project. Through verbal discussion, she has also identified the potential for her to improve aspects of her skills which she currently feels are her weaknesses.	

Project plan	Tick as appropriate
Grade C criteria	
Development of clear project objectives in line with the project proposal.	✓
Relevant and detailed planning strands to enable the project to be implemented, monitored, presented and evaluated.	✓
Realistic timescales and achievable milestones for each stage of the project.	✓
Clear identification of resources needed, research methodologies to be used, opportunities for support and feedback.	
Grade A criteria, includes all of above plus	
Careful selection and effective use of research/investigation techniques.	✓
Anticipation of probable and possible factors which may impact on the project with realistic and well considered contingencies.	✓
Clear identification of dependencies or reliance on the success of other strands of work and of necessary adjustments to the plan.	✓
Outline the process for achieving own identified development needs.	✓
Comments	
<p>'s plan engages a range of research techniques to collate information/ understanding of the topic. identifies pitfalls that may crop up and is clear as to how she will overcome these should she encounter them. clearly makes use of appropriate planning tools to ensure that this will be carried out successfully. Having already completed an initial skills audit, is aware of the need to complete additional ones within her project as a way of monitoring her performance of skills development.</p>	

Presentation of project findings/product	Tick as appropriate
Grade C criteria	
Evidence of effective and critical use of — resources, research methodologies, information and time management, prioritisation, problem solving approach to reach objectives, feedback, collaborative approaches, self-monitoring.	✓
Application of specialist and interdisciplinary subject knowledge to establish meaningful connections within the broad context.	✓
Clear presentation of main findings/outcomes.	✓
Grade A criteria, includes all of above plus	
Critical thinking, analysis and reflection used at key stages in the project to construct rigorous arguments, draw convincing, well supported conclusions, identify and resolve issues.	✓
Skilful and creative use of resources, including people, information and learning context to progress the project.	✓
Accurate and deepening of understanding through application of subject knowledge in the chosen context, with meaningful connections well established.	✓
Comments	
<p>made excellent use of feedback and analysis from a range of different sources in the run up to her presentation in order to direct possible improvements. skilfully utilised a range of resources and activities within her presentation to engage and inform her audience. Although some of the chemistry and biology concepts she researched were complex, she successfully simplified her descriptions to the level which would be easily grasped by her audience. structured her presentation thoughtfully, with an introduction of diabetes statistics before focusing on the issues of poor diets followed by examination of medical devices. This clearly linked together her different areas of research and nicely concluded her findings within each sector. dealt with any queries well and provided appropriate responses without letting it affect the direction and flow of her presentation.</p>	

Evaluation of project	Tick as appropriate
Grade C criteria	
A critical and justified evaluation of all stages of the project process — planning, implementation and findings/outcomes in terms of strengths, weaknesses and learning points.	✓
Effective use of chosen communication method(s).	✓
Grade A criteria, includes all of above plus	
Incisive, well balanced evaluation of the project outcome against project aims, supported convincingly by well selected evidence.	✓
Careful choice and skilful use of communication and presentation methods(s).	✓
Comments	
delivers a balanced and insightful appraisal of the planning, implementation and presentation stages of her project. She clearly identifies which aspects went well, however she also recognises areas which were not as successful. Alongside providing reasoning behind these challenges occurring, further describes how she overcame the challenges, such as the issue over information sharing from doctors.	

Self-evaluation of generic/cognitive skills development	Tick as appropriate
Grade C criteria	
A critical evaluation of own skills development against the list of specified generic/cognitive skills.	✓
A reasoned evaluation of own strengths and key goals for development in the specified list of generic/cognitive skills, which takes account of feedback sought and evidenced from others throughout the project.	✓
Grade A criteria, includes all of above plus	
Insightful, balanced and well structured self-evaluation of own development.	✓
Assertive and justified use of feedback from others in evaluation and identification of development areas.	✓
Comments	
builds on a range of evidence from self-evaluation skills audits, personal observations and peer / teacher feedback to justify her own strengths and further areas for development. She provides a balanced, in depth commentary throughout and demonstrates not only taking but also acting on feedback.	

The overall grade will be:

- A indicative of a highly competent performance which meets the additional Grade A criteria and consistently demonstrates a high degree of autonomy, initiative and effective information management across the five pieces
- B indicative of a competent Grade C performance across the five pieces, but with some aspects of work meeting the criteria for highly competent performance (as outlined by the Grade A criteria)
- C indicative of a competent performance across the five pieces, with all aspects of the work meeting the criteria identified for Grade C performance

Overall grade awarded	A
Additional comments/overview	
<p>successfully planned and implemented a challenging project, taking on board a number of related aspects surrounding the context of diabetes to deliver a thoroughly relevant and detailed presentation. She skilfully used a range of resources and communication techniques to collate her research and bring it together into an engaging and informative format. demonstrates going above and beyond in her research through extended visits and work experience type placements.</p> <p>consistently exhibits insightful and balanced commentary as to her progress within the project and also of her own skills development. This is clearly a project which she has significant personal investment in and something which she will continue with into higher education.</p>	

Assessor signature

Date 20/3/19

Internal verifier signature _____

Date

22/3/19