

An investigation into the extent and limitations of the GROW model for coaching and mentoring online: Towards 'prosthetic learning'

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Abstract – *Coaching and mentoring have many commonalities, but can also be seen to be different. The aim of coaching is to help a person transform being where they are to where they want to go, which may be on a path that has not yet been trodden. Mentoring is a one-to-one communication between a mentor who has “been there and done that” and a mentee who wants ‘learn the ropes.’ This paper looks at how these practices can be enabled online – through Virtual Coaches – and the extent and limitations of the GROW model for online coaching and mentoring. It finds that the GROW model is limited in what it can do, and that it needs to be extended to consider factors beyond goals, realities, options and will. It is suggested that ‘engage’ and ‘routinize’ be added to create a new model called ‘GROWER.’ An extension of the M-MARS model making it M-REAMS (i.e. Methods, Rules, Enmities, Amities, Memes, Strategies) is proposed for an ethnomethodological approach to reflective learning. The paper concludes that Virtual Coaches can provide benefits in terms of enhanced mentoring and coaching relationships.*

1 Introduction

Defining coaching and mentoring in terms of their difference [1] is difficult (i.e. what the difference between the two words is). Coaching and mentoring are both forms of learning conversations, which require reflection during and after learning conversations [2]. Even more difficult is defining coaching and mentoring in terms of the difference [1] of the words (i.e. what words are used to explain the meaning of both words and how they are different). Some have proposed that the difference between coaching and mentoring are that whilst both similar interventions they can be differentiated primarily by the extent to which they are described as being directive or non-directive [3]. These, however, may not be seen as satisfactory expressions of the difference and difference of coaching and mentoring. Both the activities coaching and mentoring can be led by either the coach or coachee. A more appropriate difference might be that mentoring is done by those who have been there and done that and want to show someone else the ropes, whereas the aim of coaching is to help a person transform being where they are to where they want to go, which may be on a path that has not yet been trodden. The difference would therefore relate to the role of the coach or mentor –

whether it is to share their experience in the case of mentoring or help the participant realise their own potential in the case of coaching.

2 Background

There are a number of important considerations when considering whether coaching and mentoring can be effectively enabled in an online space. The purpose of coaching and mentoring need to be considered, the different approaches to them and the impacts of the Internet on the practice.

2.1 The purpose of coaching and mentoring

Understanding the purpose of coaching and mentoring is therefore important. Within work, coaching and mentoring is associated with improving the level of performance, bearing responsibilities, planning and carrying out duties, following up on steps for better results, self-actualisation and creativity [4-7]. Regular coaching and mentoring, is highly significant in shaping leadership proficiency, but exerts less influence than real-time experience, providing testimony that formal and experiential learning form an important part of leadership capability, compatible with various different faiths [8]. In terms of emerging and troubled economies, such as Afghanistan, coaching and mentoring is a core component of governance reform [9]. It has been argued that working internationally can involve the use of a Virtual Coach who delivers training, coaching and mentoring online [10], something that will be explored in the rest of this article.

Concepts such as peer coaching have been shown to be effective in helping workers and teachers improve their technique, such as questioning, without being evaluative [11]. It has been argued that introducing learning outcomes into coaching can improve its effectiveness for an individual, providing the process is clear [12, 13]. In some areas, peer coaching is seen as fundamental to professional development [14]. In teaching, peer coaching often takes the form of an educator giving a lesson and then having feedback and suggestions from their colleagues [15].

2.2 Different approaches to coaching and

mentoring

The model coach mentors choose to use depends on their own context, style and approach [16]. Grounded in partnership and focused on practice, most coaching and mentoring models are dialogical, non-evaluative, confidential and respectful [17]. Coaching and mentoring models can provide intensive, direct instruction in the conceptual and procedural foundations of effective classroom practices, as well as on-going support and individualized feedback [18].

There are a number of different approaches to coaching and mentoring, each often with their associated acronyms, such as GROW, CARE, ERR, OSCAR. The GROW model, which stands for Goal, Reality, Options, Will) is generally accepted to be the standard method for coaching and mentoring and the teaching of it [19]. In summary it reinforces a positive sense of identity by mapping a person's wishes according to their goals, the reality, their options and their will [20]. The CARE model, which stands for 'creating' comfort, raising 'awareness', 'reawakening' the flow of learning, and 'empowerment' is designed around a framework with a two-fold purpose. This is to provide a guidebook of techniques and behaviours to encourage learning, and to ensure beliefs and values that underpin the model are put into practice [21].

The ERR model, which stands for Emotion, Reality, Responsibility is intended to acknowledge one's 'emotions' and stay with them, explore the 'reality' of the situation and separate facts from assumptions, as well as to be coached to get ownership and 'responsibility' for actions and decisions [22]. The OSCAR model, which stands for Outcome, Situation, Choices, Actions, and Review, builds on the GROW model, with Outcome reflecting Goals, Situation reflecting Reality, Choices and Consequences reflecting Options and Action and Review reflecting Will [23].

2.3 Extent and limitations of coaching and mentoring through digital technologies

Whilst in-person coaching is the most common method used, virtual coaching is becoming more prevalent [24]. Some critics have gone so far as to say coaching is only truly effective when done in person [25]. One might compare coaching and mentoring on the Internet as a form of online interviewing. Many people online prefer to observe and not to post as a result of problems feeling comfortable to participate might exist with a Virtual Coach [26-28]. Online interviewing can, it is argued, allow individuals to develop their own order, goals and interests [26, 27, 29], which is perfectly appropriate for coaching and mentoring. One-to-one coaching online may not have the problem of having to work through elders or other users [26, 27], and as many people have preferred ways of communicating online [26, 27], then Virtual Coaches may have to consider the preferred platform of communication for their coachee or mentee. This is known to be a factor in the effectiveness of virtual coaching, as selecting the most appropriate method of virtual coaching is the key to a successful relationship between coach and coachee [30].

Technology is known to be a core factor in ensuring effective virtual coaching, in terms of its development and execution [31]. Virtual coaching, by using technology, can allow for the provision of feedback, such as to learners, which can shape the learning process and the awareness of each party's strengths and weaknesses [32]. Indeed, it is possible for technology that is used for virtual coaching to be manufactured in order to encourage user acceptance [33].

The economic and business case for virtual coaching is also important. With education budgets falling, virtual coaching can save both time and money [34]. It is known to be very effective in ensuring the professional development of staff [35], as well as improve business management skill in education environments [36, 37].

Virtual coaching can help people with disabilities, such as social orientation impairments, especially those with special educational needs (SENs) also [38]. Virtual coaching can help people with SENs overcome problems, such as impairments in functional skills [39, 40]. Professional communication expertise is always helpful in virtual coaching, especially where disabilities and other protected characteristics are accommodated [41].

3 An investigation into the effectiveness of coaching and mentoring for the personal development of working persons

This investigation seeks to assess the efficacy of the GROW model for coaching and mentoring online. The method is not without criticisms, and some have critiqued the way it fails to consider where people are coming from before attempt to determine where they want to go [42]. This section looks at whether such a finding is replicated in online environments – where a lot of barriers are broken down.

3.1 Participant

The participant in the study was not a genuine coachee or mentee, as this would have involved significant ethical considerations, but as the person was experienced in coaching and mentoring, they would be able to provide an authentic context for assessment. Ethical considerations that were implemented however, included the right for the participant to exit taking part in the study if they felt they wanted to, for which they would face no penalty. Online participation posed fewer problems in this regard also.

3.2 Methodology

The GROW method was chosen for its wide use as a near standard method and paired with best practice, namely the do's and don'ts recommended in [43]. This formed the template visible in Annex I, which the researcher referred to when coaching to attempt to provide a systematic approach to what is otherwise a subjective process. This might compare with an emotionalist approach [44]. The session, on Skype, was

recorded with the permission of the participant and then evaluated using Gibb's reflective cycle [45]. This is applied both in terms of the researcher's thoughts and their reading of the participant's theory of mind. The conclusion 'and' action plan parts of this cycle, however, are applied in the conclusions section. The participant was given the name 'Terry' and it was taken that he was 'referred' to coaching because although he was a 'talented and innovative employee' he was beginning to feel 'stuck in a rut' and was demotivated at work so wanted to explore why that is and how to get 'back on track' again.

3.3 Results

In terms of the description of Gibb's cycle, the recording when analysed suggested that focussing on the goals of the mentee could actually assist with the building of a rapport between them and the mentor/coach. It was clear to identify using the GROW model that the person's difficult was with motivation, as they felt a lot of the autonomy they once had that they lost, showing that by exploring goals the reality can be identified also. Using questions around 'options' appears quite key to understanding the situation, from which the intensions and way forward for the mentee/coachee can be identified and agreed, such as being part of an action plan.

Turning to the specific aspects of the session relating to the use of the online environment it was clear that the aspect of Gibb's cycle relation to emotion and evaluation were most applicable. One might see from the records that the use of online conferencing, such as Skype can actually break down many of the barriers to bonding and rapport. It was much more effective in terms of using a headset to pick up the different tones from the participant in order to judge how best to respond, such as framing the appropriate question. However it is easy to see how more traditional mentees/coachees might not warm to this in the same way, finding the loss of some affective information such as body language would reduce the trust building process rather than enhance it.

It is possible to conclude from this study that coaching and mentoring online can have lots of benefits for an organisation in terms of allowing coaching and mentoring to take part in an environment that the mentee/coachee feels comfortable with. Although the study used a synchronous approach through Skype, other forms of online coaching/mentoring are possible. Email would allow for a more reflective and experiential approach, that would bring out the 'been there and done that' experience of a mentor, as well as the more 'how do we get there' approach in coaching. The study did, however identify limitations in the GROW model that might be better reflected in future coaching and mentoring endeavours.

There are things to be learned from the other models available that could perhaps be used to enhance the GROW model. The addition of the 'Action' and 'Consequences' elements in the OSCAR model are somewhat helpful, but appear to do nothing more than reinforce the main aspects of GROW. The Empowerment component of the CARE model could be used to enhance what is proved through GROW, going beyond the CARE model, by focussing on the development of skills and not just the realisation of where one has been and where one

wants to go. Figure 1 proposes adding two other elements to make the acronym GROWER, which are 'engage' and 'routinize.' In the case of the first, this refers to the need to understand what it is that motivates the mentee/coachee above all other things, so that the coach/mentor can devise options that most fit with the person's outlook.

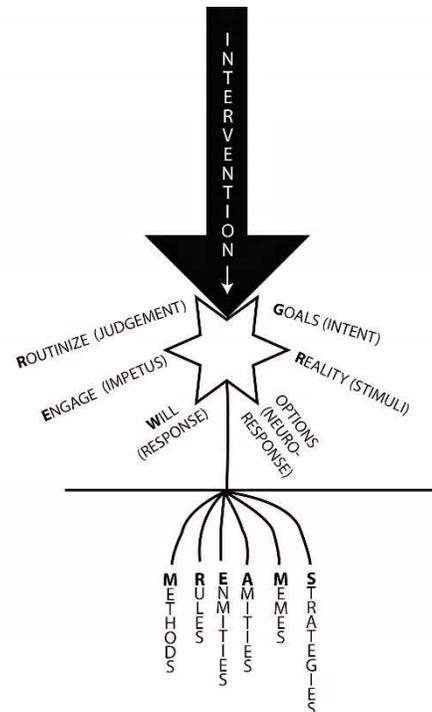


Figure 1 The GROWER model as an online alternative to the GROW model

An example in the study was the participant being identified as being motivated by autonomy and independence. In the case of the second, it is usually necessary as part of a coaching/mentoring session for certain skills or practices to be developed for long-term benefit. In the case of the participant in this study that was reflected in terms of them seeking out opportunities where they can make use of their self-managing abilities. In addition Figure 1 suggests the 'M-REAMS' approach, by extending the M-MARS approach in [46] to include 'enmities,' based on the newly identified 'bothered' cognitive bias. Enmities are people who inhibit one's goal. In the case of the participant in this study that was his line-manager. The model as a whole can be useful for reflecting on a coaching session, as an alternative to Gibb's model, which along with the 'GROWER' model provides an integrated approach to reflecting mentoring/coaching. With online approaches, it is possible for participants to record the conversation and play it back to enable reflection. Thinking in terms of the 'Methods' (e.g. what approaches they use or want), their Rules (what they feel they must do), their Amities (who they feel is on their side), their Memes (what they believe or want to believe) and their Strategies (what they want to

achieve) can complement the original GROW model as well as the proposed GROWER model.

4 The role of the Virtual Coach and GROWER model in transforming learning in traditional teaching contexts

It is known that an important part of knowledge transformation is the development of a personal relationship between an educator and a learner. When most think of education, this usually creates word pictures of a teacher at the front of a class, who might best be seen as a broadcaster of information [47]. As this paper has shown, personal relationships are not developed through isolationist practices like classroom-based teaching focused around the teacher as the fountain of all knowledge. They are based designing one's organisation around more personalised development, whether one-to-one contact, like Skype or email, or informal learning where learners pick up knowledge in non-formalised contexts where learning outcomes drive the direction of activity.

4.1 The role of Classroom 2.0 enhanced by prosthetic technology to aid Virtual Coaching

Classroom 2.0 is the name given to an approach to education, based on network learning, where students participate not only with their peers in a physical space (i.e. Organic communities), but also in a virtual space (i.e. virtual communities), such as through telepresence. The term Classroom 2.0 was coined by Spanish and Italian academics [48], but the concept has existed for much longer [49-51].

Table 1 Merging the GROWER model with Classroom 2.0 practice

| Component | Description |
|-----------------------------------|--|
| The physical learning environment | The physical environment, represented by the arrow in the GROWER model, is the part of the model where the intervention towards the coachee occurs |
| The mediated environment | The mediated environment, represented by the star in the GROWER model, is the user interface through which stimuli is presented to evoke thoughts in the coachee. |
| The augmented environment | The augmented environment, represented by the shoots going into the ground in the GROWER model, is the interface between the human and the computer through which the user is subjected to and influenced by changes to their environment and their belief system. |

Table 1 sets out the common elements of a typical networked learning environment based on Classroom 2.0 synthesised with the elements of the GROWER model.

4.2 The physical learning environment

The physical learning environment for the system is based around the AVEUGLE system devised as part of the Digital Classroom of Tomorrow Project [49, 52].

Using either PCs, tablets, smartphones, or similar, the learners can take part in a networked learning environment, where participants can be taking part at a distance or within the classroom. The physical environment is therefore very different for each learner, who may be using different hardware set-ups and may be in different settings if they are interacting at a distance.

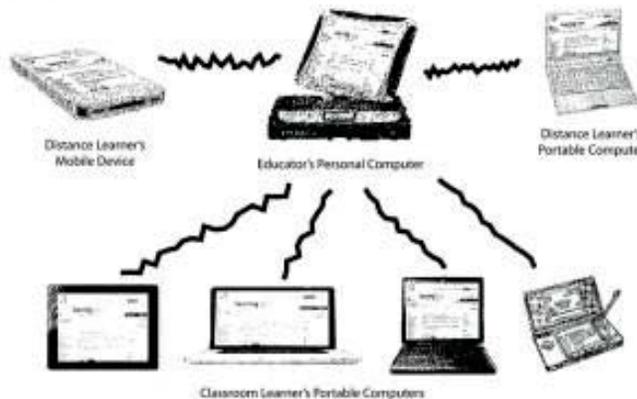


Figure 2 Conceptual framework for the AVEUGLE component

As can be seen from Table 2, the educator uses their PC as a facilitating device to suggest responses or actions to learners, who interact with each other either in person or remotely. This generally involves and instruction from the educator, which may involve responding to a request through an audience response plug-in.

The capturing of information from learners can take many forms, but generally it involves collecting data from the one learner, the network, and the learner or educator they are connected with in a networked learning environment.

The translator element takes inputs, such as facial, dialogue or prosody effect [53], or user response data on their interests [49, 52] for instance. The translator does not attempt to persuade the users of the networked learning environment, only provide information on what the other person means.

This can be essential for ensuring any implementation of the GROWER model, as the system should be able to detect the existence of external representations in order to detect in the networked learning environment factors such as methods, rules, enmities, amities, memes and strategies, which are observable from detecting the goals (i.e. Intent), reality (i.e. stimuli), options (i.e. neuro-response), will (i.e., engage), and routinize (i.e. judgement).

Table 2 Functions of the AVEUGLE component

| Function | Description |
|-----------------------|--|
| Sending User/Device | This can include the device of the educator or learner, from which information can be sent through a server, or bridge for instance. |
| Receiving User/Device | This includes the device used by the educator or teacher, through which information from the system, including educator instructions and learner feedback, is displayed. |
| Translator | Presents information to a learner in the language they understand, including based on ability and learning level |
| Facilitating Device | Used by the educator to fine tune the learning experience of learners' devices |
| Bridge | Allows users to connect over a virtual space sharing information |

4.3 The mediated environment

The mediated environment is based on an invention called PARLE [53]. As can be seen from Figure 3, PARLE is a system for receiving information from the device of one user, processing it over a server, translating it into a more suitable piece of information and then presenting that to the receiving user.

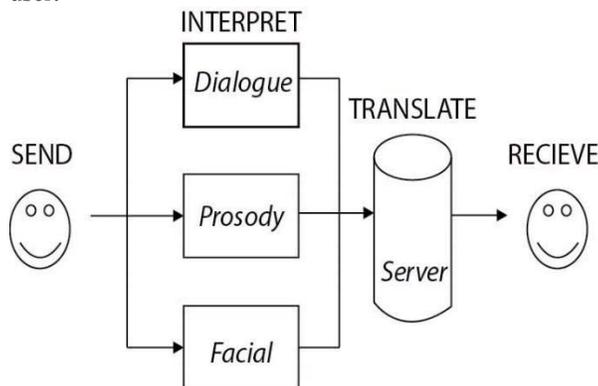


Figure 3 A conceptual framework of the PARLE component

Table 3 presents the functions of the PARLE component and describes how they work. As can be seen, the translator is a core component of the system. This receives information from one person, processes it to determine the meaning, and then tells another person of the meaning. This includes emotional information, as presented in Table 3, but can include cultural codes more generally. The problem with distance communication is that miscommunications can occur, which can affect the coach-coachee relationship.

Table 3 The functions of the PARLE component

| Function | Description |
|------------|--|
| Translator | Receives sent information, such as audio/video; interprets it into dialogue, prosody and facial affect; translates it into a meaning another user can understand |

| | |
|------------------|---|
| Server | Allows for the interaction of two or more users, such as in a classroom or remote from it |
| Receiving Device | Displays information, such as translation, to a user, such as in a classroom or remote from it |
| Bridge | Allows for users to interpret others via their Devices remotely using a Server |
| Sending User | The user that is sending information, such as audio and video captured through their device. |
| Receiving User | The user that makes use of the sent information that has been parsed through a translator |
| Sending Device | The device used by the sending user, such as a phone with front facing camera or video/Internet glasses with a camera facing another, in order to send information to another user through a server, bridge or similar. |

4.4 The augmented environment

The augmented learning environment, called PAIGE (Figure 4), is used to provide statements or instructions to users based on their response to previously presented information [54]. In terms of a Virtual Coach, this could include them being told what a user is meaning at a distance, and give a number of suggested responses for them to enhance the coach-coachee relationship.

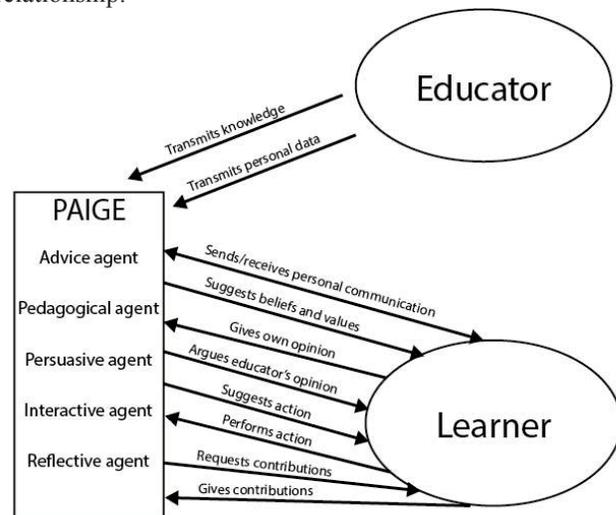


Figure 4 A conceptual framework of the PAIGE component

Table 4 presents the functions of PAIGE, which as can be seen are very similar in structure to PARLE, making developing a system to enhance the coach-coachee relationship that much easier.

Table 4 The Functions of the PAIGE component

| Component | Description |
|----------------|---|
| Sending User | The sending user can be the educator populates the database or the user who interrogates it |
| Receiving User | The receiving user can be the learner who is being persuaded by the |

| | |
|--------------------------|---|
| | system, or the educator who can modify the database |
| Sending/Receiving Device | The learner's device will receive instructions and be used to reply to those |
| Intelligent Agent | The intelligent agents identify the most effective means to advise, persuade and assist the user in interaction, learning and reflecting. |
| Translator | Translates educator's knowledge instructions into ones learner can understand and be persuaded by |

5 Towards AVEUGLE – The Audiovisual Enhanced UI for a GROWER Learning Experience

This section presents the amalgamation of the AVEUGLE, PARLE and PAIGE components as set out above into a system called the Audiovisual Enhanced UI for a GROWER Learning Experience (AVEUGLE).

As can be seen from **Erreur ! Source du renvoi introuvable.**, AVEUGLE involves at least two people, sending and receiving information, who can either interact in person within an organic community or remotely through a virtual community. Whilst devices, servers and routers are referred to in the Bridge component in the middle of **Erreur ! Source du renvoi introuvable.**, it is quite possible other technologies could be used, such as an educator's laptop as shown in Figure 2 adessus.

The key element of AVEUGLE is that it has sending and receiving users using some form of device, this is interfaced with a bridge or facilitating human, through which a translator and artificially intelligent agents enhance the communication of the coach and coachee.

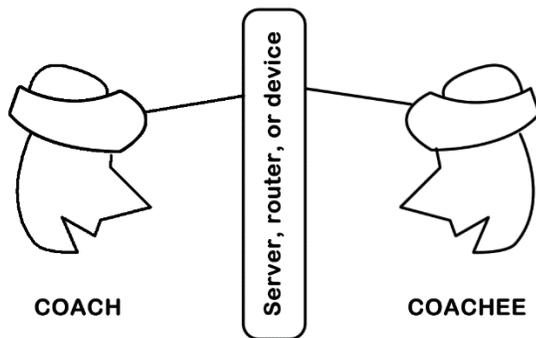


Figure 5 The AVEUGLE prosthetic learning environment for Virtual Coaching

5.1 Sending/Receiving User/Device

The sending and receiving component of AVEUGLE can include the one that a coachee is most familiar with, or in the case of sessions in organic communities it could be used by the

Virtual Coach in person, and could take the form of a Google Glass, or Microsoft HoloLens.

The purpose of the technology would be to allow the Virtual Coach and coachee to send and receive information that is accessible to both, such as to overcome cultural or other differences that might make a relationship difficult. Figure 6 presents an example interface AVEUGLE could use.



Figure 6 A possible interface for AVEUGLE augmenting information with a live video input

5.2 Facilitator/Bridge

In most cases the information from the sending and receiving devices will have to be parsed through some form of device, which can include the Virtual Coach's computer, or a Cloud-based device such as a server. Using a server can mean a lot of the processing power needed for AVEUGLE would be away from the client device, and would improve the user experience. Ensuring the interoperability of bridges is known to affect the extent to which a technology functions and is used in domestic environments [55]. It is know that with e-learning systems in particular that using bridges for interoperability is essential [56].

5.3 Translator

The translator component of the system receives information, processes it and then provides a statement or recommendation [53, 54, 57]. As can be seen below, it involves working with language use and behaviour detection; language translation; an intelligent agent and recommender system; as well as fluid and dynamic text.

5.3.1 Language use and behaviour detection

The system has been designed to be able to identify representations of social norms in virtual communities, which may be different from those in organic communities. Understanding behaviour and the use of language is known to be important in online learning environments designed to promote user interaction [58].

Understanding language use in online environments is important in helping avoid unwanted behaviours such as flaming or trolling [59].

Table 5 Example language use and behaviour detection for Empathics

| Organic community want | Virtual Community want |
|---|---|
| Give an empathic twenty minutes of unsolicited, quality attention each day | Calculating the length of time two people chat for |
| Bring an empathic flowers as a surprise as well as on special occasions | Calculate number of virtual gifts sent |
| Compliment an empathic on how they look | Identify compliments in chat text |
| Give an empathic four hugs a day | The number of times a 'send a hug' card is sent, posts liked, etc. |
| Tell an empathic: "I love you at least a couple of times every day" | Count the number of times a person says "I love you" |
| Take her side when she is upset with someone. | Difficult, although phrases such as "I believe you" could be searched for |
| Display affection in public. | Check whether symbols of love are said in public chat room other than a private one. |
| Pay more attention to her than others in public. | Check that the number of chat messages to someone's partner is greater than to other community members. |
| Buy her little presents, like a small box of chocolates or perfume. | Calculate the number of greetings someone send their partner |
| Write a note or make a sign on special occasions such as anniversaries and birthdays. | Calculate the number of greetings sent or classifieds placed to someone's partner near their birthday or specified event. |
| Surprise her with a love note or poem | Calculate the number of 'Love' greetings sent. |
| When listening to her, reassure her that you are interested by making little noises. | Check for words of agreement in chat text. |
| Ask her how she is feeling | Check for phrases such as "how are you" in chat text. |
| If she has been sick in some way, ask for an update and ask how she is doing or feeling | Check number of "Get Well Soon" greetings are sent. |
| Let her know that you missed her when you went away. | Calculate number of "I missed you" or "welcome back" greetings. |

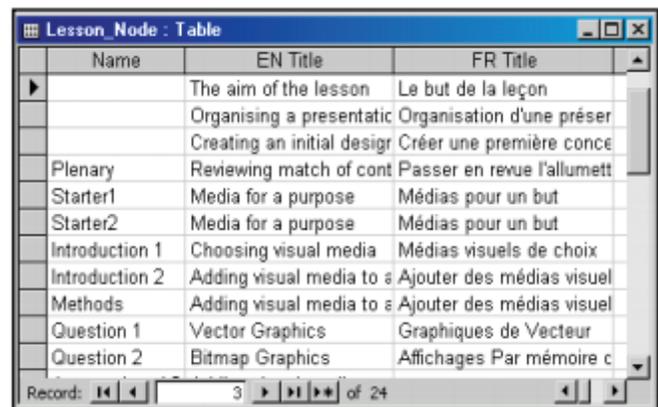
As can be seen from Table 5 and Table 6, there are differences in language behaviour online compared to offline [60].

Table 6 Examples of language use and behaviour detection by Autistics

| Organic community want | Virtual community want |
|---|--|
| He makes a mistake and she doesn't say "I told you so" | Check that chat text does not include "I told you so" |
| He disappoints her and she doesn't punish him | Check that chat text does not include certain negative words |
| When she has hurt him and she understand his hurt, she apologises and gives him the love he needs | Check for words of apology in chat text, such as "I'm Sorry". Calculate the number of "I'm Sorry" cards that are sent. |
| When he apologises for a mistake, she receives it with loving acceptance and forgiveness. | Check for keywords in chat text, such as "that's okay" |
| She asks for his support rather than dwelling on what he has done wrong | Check for keywords such as "can you" or "would you" in chat text. |

5.3.2 Language translation

The device and/or bridge could detect cultural cues as well as other information, in order provide a recommendation based on this [54]. This can include updating a person's reputation value (i.e. kudos score) so people know they are likely to be treated more favourably [60].



| Name | EN Title | FR Title |
|----------------|----------------------------|----------------------------|
| | The aim of the lesson | Le but de la leçon |
| | Organising a presentatic | Organisation d'une préser |
| | Creating an initial design | Créer une première conce |
| Plenary | Reviewing match of cont | Passer en revue l'allumett |
| Starter1 | Media for a purpose | Médias pour un but |
| Starter2 | Media for a purpose | Médias pour un but |
| Introduction 1 | Choosing visual media | Médias visuels de choix |
| Introduction 2 | Adding visual media to a | Ajouter des médias visuel |
| Methods | Adding visual media to a | Ajouter des médias visuel |
| Question 1 | Vector Graphics | Graphiques de Vecteur |
| Question 2 | Bitmap Graphics | Affichages Par mémoire c |

Figure 7 Cultural translations from AVEUGLE

The system could track what someone says in a discussion group and then translates this according to its merits (i.e. whether it is positive or negative) and then display that translation through increasing or decreasing someone's reputation, affecting how others perceive them in the online space they are present within [60]. Language translation that takes account of cultural cues is known to be important in promoting equality and diversity [61]. Difficulties with translating language and cultural cues is known to be a problem assisting the integration of minorities into communities [62], so

having this functionality in a virtual coaching environment is essential.

5.4 Intelligent agent and recommender system

The intelligent agent and recommender system can be implanted through sending statements to the AIML file and the possible response back to the user. This can be used initiate culturally aware instructions.

Recommender systems have played a big part in e-commerce for decades [63], and there is no reason for not be introduced into education. Such systems can be introduced into the education system through animated pedagogical agents, which are virtual characters that augment the learning process [64].

An example of how the animated pedagogical agent that could be user facing in order to gather information is presented in Figure 8. Furthermore, as the interests of secondary school learners are likely to change frequently [65], educational material will always appear current and relevant if the learner is encouraged to update their profile [49].



Figure 8 An intelligent animated pedagogical agent for use with AVEUGLE

Through the APA, educators have the option to embed parameters into learning material to personalise it with textual artefacts that have been defined by the individual learner. This is achieved through placing the parameter into a specific part of the text and surrounding it with parentheses.

For example, if the learner’s favourite actor was Tom Cruise, the text, “Write about a movie starring {User_Char_FavActor} that you enjoyed” would be converted into “Write about a movie starring Tom Cruise that you enjoyed”, which should create a positive attitude towards the activity as it is about something the learner is interested in.

Furthermore, as the interests of secondary school learners are likely to change frequently, educational material will always appear current and relevant if the learner is encouraged to update their profile.

5.4.1 Dynamic and Fluid Text

Dynamic text, which involves the personalising of an interface to the learner, has been used significantly in systems based around Adobe Flash [66]. Educators have the option to embed parameters into learning material to personalise it with textual artefacts that have been defined by the individual learner. This is achieved through placing the parameter into a specific part of the text and surrounding it with parentheses [49]. For example, if the learner’s favourite actor was Tom Cruise, the text, “Write about a movie starring {User_Char_FavActor} that you enjoyed” would be converted into “Write about a movie starring Tom Cruise that you enjoyed”, which should create a positive attitude towards the activity as it is about something the learner is interested in. Table 7 shows how they system adapts the language depending on the ability of the learner using it.

Table 7 Adaptive learning levels in AVEUGLE

| NC Level | Bloom Level | Personalisation |
|----------|-------------|---|
| 1 | 1 | Knowledge: Restructures content and rewords questions to encourage observation and recall of artefacts and subject matter |
| 2 | 1 | As NC level 1 |
| 3 | 2 | Comprehension: Restructures content and rewords questions to encourage learners to develop a social context of artefacts and understand their meaning. |
| 4 | 2 | As NC level 3 |
| 5 | 3 | Application: Restructures content and rewords questions to encourage learners to apply knowledge to other social context and situations. |
| 6 | 4 | Analysis: Restructures content and rewords questions to encourage learners to make relationships between artefacts and recognise patterns and hidden meanings |
| 7 | 5 | Synthesis: Restructures content and rewords questions to encourage learners to use artefacts in different contexts and situations and develop new concepts and ideas. |
| 8 | 6 | Evaluation: Restructures content and rewords questions to encourage learners to compare uses of artefacts and develop theories and select artefacts based on reasoned argument. |

Figure 9 presents an example of the way a system can provide additional information to users to make using the system more suited to their ability or other differences [49].

In this case the “longdesc” attribute, which is used to provide longer and more detailed descriptions (No Reference Selected) is modified so that by looking at the bottom of a browser, the user can see the purpose of the link they are hovering over.

Using a prosthetic system like Google Glass, it would be possible for this to be implemented using menu selection and stroke input [67].

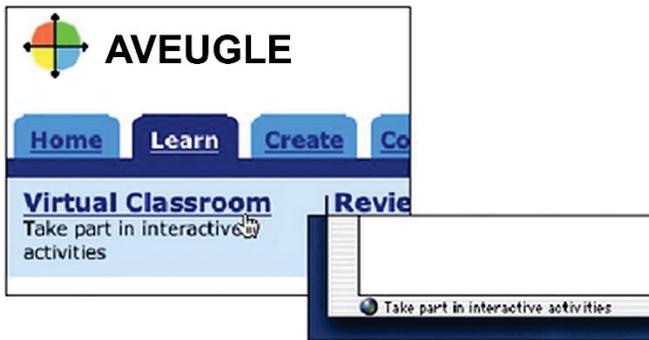


Figure 9 An example of how links can be made fluid through adaptive technology

6 Discussion

This study has sought to look at the purpose, benefits and appropriate situations for coaching and mentoring in the workplace. In particular it has look at the roles Virtual Coaches can play by using techniques such as synchronous interviewing on Skype. Such an approach makes managing issues to do with ethics much simpler and also break down some barriers to communication in many different mentees. The study has identified that there are many different models for coaching and mentoring, including long established one's like GROW. But even these are limited in application to the internet, where factors like intrinsic motivation and the development of specific and targeted skills are an issue.

Through carrying out a test of an online coaching session using Skype, which was based on the scenario of an employee named Terry, who was 'stuck in a rut,' it was clearly to see that a Virtual Coach can be as effective as an offline one. It was also found that coaching and mentoring online can actually enhance the ability to pick up on tone of voice for a more systematic and empathetic approach to assisting a coachee or mentee. It is clear from this study that there are a lot of benefits to being coached or mentored by a Virtual Coach, but the methods used may need to be revised, and greater focus is needed on the coachee/mentee in order to build rapport.

This study then fed into the design of a system that could enhance the coach-coachee relationship, including through the use of prosthetic technology. The system proposed using devices to send and receive information through a server or an educator's device as a facilitator, which can then be translated into something more appropriate for users. This could for instance break down any language barriers caused by differences in culture.

6.1 Implications and Future Research Directions

This paper has established that a Virtual Coach can be as effective as one where communications take place in person.

By carrying out a recorded coaching and mentoring session online, it was possible to see the implications of the practice. The existence of Virtual Coaches can therefore offer benefits to workers, especially as they can be in any place when taking part in a coaching or mentoring session. Future research will have to look at the effectiveness of coaching and mentoring online in more detail, such as through observing many more participants than in this study.

Coaching and mentoring can be effectively carried out online and have the same benefits as in-person mentoring, but without many of the social barriers that online participation filters out. Changes are needed however to take account of the differences between online and offline coaching, and as this study has shown, the GROW model can be effective in providing structure, but its absence of encouraging the understanding of what motivates a particular individual being coached or mentored means it might not provide the easy opportunity to build rapport through the coach being able to convey empathy and understanding. Thus future research will be necessary to extend the findings of this study – that to improve engagement understanding intrinsic motivations is necessary – will have to be explored further. The study also found that it is important in any coaching setting, but especially online, for the coachee/mentee to routinize what they have learned so that it is possible to take more from the session than it being a simple chat or conversation. Future research will need to look at the specific approaches that can be used to facilitate this.

The paper has proposed a system, called AVEUGLE, for assisting the interaction between a Virtual Coach and their coachee, which can be implemented through existing devices as well as newly emerging prosthetic technologies. Further research will have to implement the system design of AVEUGLE and test whether it can actually improve the coach-coachee experience. The embodiments of AVEUGLE in this paper have focussed mainly on online coaching and mentoring. Future research should consider its wider implications for increasing access to information more generally. For instance, those who find it difficult to watch films and know what is going on due to a lack of awareness of the affective states of characters could be given real-time information about this, and recommended options. Other research could look at using the chat-functions of AVEUGLE to make literature more accessible to those who would otherwise be unable to access it.

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