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ITP4789

WISDeM and E-learning System Interaction Issues

W.A.Janvier and Claude Ghaoui
School of Computing & Mathematical Sciences
Liverpool John Moores University
Byrom Street, Liverpool L3 3AF, UK
Telefax: 01704.232147
Email: cmswjanv@livjm.ac.uk & c.ghaoui@livjm.ac.uk

INTRODUCTION

This paper discusses interaction between the computer interface and the user in e-learning. [Catania 1992] reports that sensory input is mainly derived from iconic 60%, auditory 30%, and haptic 10% with little from olfactory and gustatory. [Driscoll and Garcia 2000; Fleming 2001; Fleming and Mills 1998; Fuller et al. 2000; Murphy et al. 2002] show that everyone has his/her own preference for exchanging ideas, acquiring and passing on knowledge. [Sadowski and Stanney 1999] report that there is a tendency to prefer one sensory input (visual, auditory or kinaesthetic – tactile/haptic) whilst [Fleming 2001]'s research shows that most students prefer multi-modal communication.

[Janvier and Ghaoui 2001; Janvier and Ghaoui 2002a; Janvier and Ghaoui 2002b] consider that correct inter-communication style should be established and started before learners commence their e-learning: their research hypothesis is *"Matching language patterns in an intelligent agent/intelligent tutoring system (ITS) will enhance human computer interface (HCI) communication and, thus, enhance the storing of and recall of instances to and from the learner's memory"*.

INTELLIGENT TUTORING SYSTEMS

Research indicates that an ITS should be intuitive and accessible via the Intranet/Internet, and encompass: Self-Directed learning [English and Yazdani 1999], Asynchronous and Synchronous communication [Phillos et al. 1999; Turgeon 1999; Wang et al. 2000] with 'Intelligent Interaction' offering relevant links to library, system resources, world-wide-web (WWW), hints and structured answers. The expert system should wrap an intelligent cover around learning modules creating a learning module/intelligent tutor interaction [Butz 2000 (2)].

[Nkambou and Kabanza 2001] report that recent ITS architectures have focused on the tutor or curriculum components paying little attention to planning intelligent collaboration between different components. They suggest that the ideal architecture contains a curriculum model, pedagogical model and a learner model.

MULTI-MODAL INTERACTION

E-learning multi-modality uses multiple-student-sensory inputs. [Pasztor 1998a] reports that inter-partner rapport is key to effective communication and that incorporating NLP language patterns and eye-gaze (see also [Colburn et al. 2000; Sadowski and Stanney 1999]) in intelligent agents will allow customisation of the (virtual) personal assistant to the particular habits and interests of the user making the system more user-friendly. [Pasztor 1998b] confirms that introducing the correct sub-modality (visual, auditory, kinaesthetic) will enable the subject to more easily remember and recall instances.

VARK and MBTI[â] in E-learning

[Fleming 2001]'s VARK suggests four sensory-modality-categories that reflect students' experiences used for learning:

- **V**isually orientated prefer information input via their eyes, in charts, graphs, flow charts, and symbolic representation,
- **A**ural orientated prefer hearing information,
- **R**ead/write orientated prefer information displayed as words,
- **K**inaesthetic orientated "learning by doing", learning by simulated real-world experience and practice.

His research shows that the number of multi-modal students in a class can range from approximately 50% to 90%, depending upon context. [Driscoll and Garcia 2000] report that results from student class profiles using VARK, indicate that their *Learning Styles are firmly in place by the time a student is 18 and may well differ substantially from what their tutors perceive or assume*.

[Myers and Myers 1995]'s MBTI® is a self-reporting personality inventory designed to provide information about your Jungian psychological type preferences[i]. MBTI® has four preference categories: i) Interpersonal Communication - ***E****xtroversion* focuses outwardly on and gains energy from others, ***I****ntroversion* focuses inwardly and gains energy from ideas and concepts, ii) Information Processing - ***S****ensing* focuses on the five senses and experience, *iN*tuition focuses on possibilities future use, the big picture, iii) Information Evaluation - ***T****hinking* focuses on objective facts and causes and effect, ***F****eeling* focuses on subjective meaning and values, and iv) Decision Style - ***J****udgment* focuses on timely, planned conclusions and decisions, ***P****erception* focuses on the adaptive process of decision making.

AVATARS IN E-LEARNING

Using Avatars in e-learning is currently being widely researched and developed creating guidelines for ITS interaction.

Interesting "ActiveWorlds" (http://www.activeworlds.com/edu/eduaw.asp), a typical 3D avatar world offers online facilities including the usual DLT components PLUS 3D-synchronous-avatar-world-chat. The interaction tends to keep students interested; however, tutor involvement in real-time chat requires careful lesson and time planning (see also [Riedl et al. 2000] on Active Worlds and [Vilhjalmsson 1997] on BodyChat).

[Colburn et al. 2000] states that there is a high correlation between changes in eye gaze and specific conversational actions and that avatars' development needs to pay attention to both the look and the behavior of the avatar's eyes with reference to eye gaze patterns in the context of real-time verbal communication. If the computer interface includes an anthropomorphic graphical representation it is likely that the user can interact more naturally with the interface, current developments do not offer this facility. Eye gaze is vital to the control of normal human-human interaction providing clues for changing speaker and understanding: much research is being directed towards automating avatar expression to correspond to conversation. [Deray 2002] reports that intelligent characters (avatars) are currently quite limited and that how useful and believable they are depends on the extent to which they are integrated into a specific environment and set of tasks: effective-believable interaction does not necessarily mean *lifelike*, rather it should be recognized as *lifelike* behavior.

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WISDEM – THE DISTANCE LEARNING TOOL[II]

[Janvier and Ghaoui 2002a; Janvier and Ghaoui 2002b] argue that human-computer interaction from inception is vital. It is necessary for the computer to interact with the user AFTER establishing the user's communication preference and learning style. In the real-world human-human inter-communication includes automatic perception of communication preference. Communication preference is conveyed, amongst other things, by eye-movement, eye-gaze and Neuro-linguistic Programming language patterns. WISDeM has been developed as a generic Distance Learning Tool (DLT) including all normal DLT components. It uses a Web-database front-end for authoring the look-and-feel of the tool, the module content is authored using MS Word, Excel, PowerPoint and, if required, an HTML editor. The DLT uses HTML, DynamicHTML, CSS Style, JavaScript, Active Server Pages, and Structured Query Language linking to the database using ODBC. The student's DLT includes: university links, registration and login, low-vision user facility, staff information and module content {overview, specification, main topics, coursework, exam papers, revision (multi-choice Q&A), tutorials, courses (additional information)}, resources, download, evaluation, feedback, forum, mail-list, student registration, search, help, MS NetMeeting). The Intelligent Tutoring System (ITS) section is currently being developed starting with Communication Preference and Student Personality Type to create the initial Student Learning Style to use with the inference engine.

Scenario

A new learner connects to WISDeM and selects his/her school and module. The learner uses his/her University Registration ID, password and Module selection to log on. The system checks if the user is new or existing: if the former, the Communication Preference (CP) question/answer screen is opened. The student is asked to complete the CP questionnaire by selecting only those statements with which he/she agrees. When completed the Learning Style question/answer screens are activated. The questions/answers are couched using the learner's NLP Language Pattern as ascertained from the CP answers. The resulting Learner Profile is saved in the Learner Profile Repository and the module front page is opened (see Fig.1).

Figure 1 - Communication Preference & Learning Styles

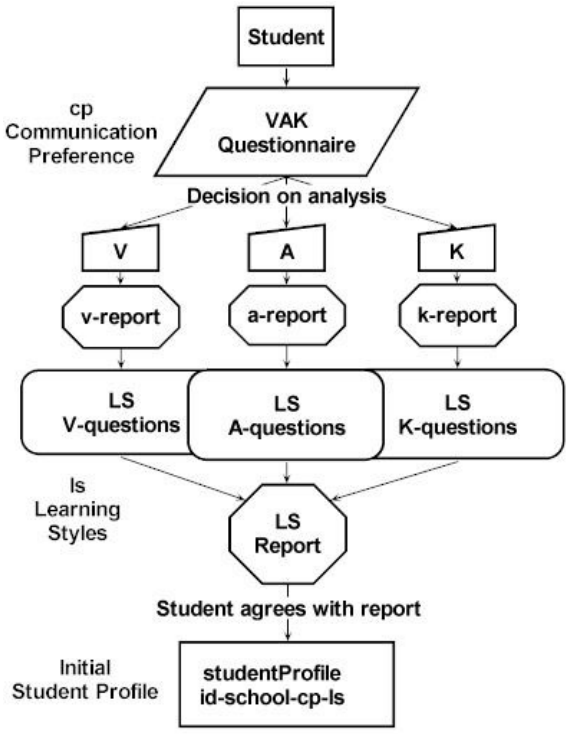
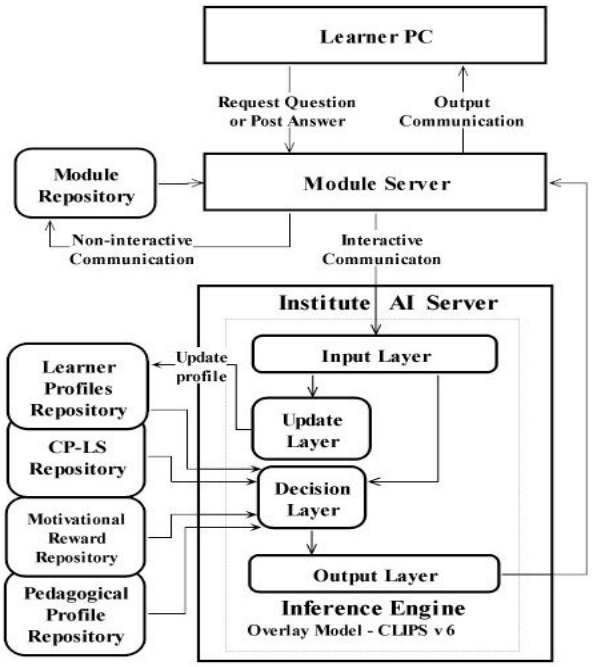


Figure 2 - WISDeM's proposed final architecture



CONCLUSION

The interaction between the computer interface and the user in e-learning is rapidly developing to include multi-modal interaction with researches taking more cognisance of the user's sensory preferences and thus the ability of the interface interaction to be more natural. This needs to provide for Human-Computer interaction to be as realistic as possible and include Communication Preference and matching Learning Styles with Teaching Styles from inception.

FUTURE DEVELOPMENT

WISDeM is being designed to link CPLS with teaching styles and motivational feedback for both the novice and expert user [Handley 2002] and provide facilities for the learner to change the functionality if required. Figure 2 shows the intended development that is currently taking place.

ENDNOTES

[i] **Jungian psychological type preferences**: Carl G Jung was a Swiss psychiatrist (1875-1961) who identified certain psychological types (Extroversion/Introversion – Judgment / Perception)

[ii] **WISDeM** – Web Intelligent Student Distance-education Model

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