

The Role of Culture in Online Education: as an input for the authoring process

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Abstract: This paper reports on the ongoing research of using the *Cultural Artefacts in Education* (CAE) questionnaire to determine the educational values of global cultures. In particular it examines the desire for adaptation across cultures in an educational setting. Here we present the initial findings from students from five different cultural backgrounds. These results can feed into the authoring process for adaptive content, with teachers being able to use stereotype adaptation to deliver content pre-adjusted to a learners cultural needs.

1. Introduction

Adaptive Hypermedia (AH)[2] is concerned with delivering a personalised Web experience to each user. For example in Adaptive Educational Hypermedia (AEH)[0], learning materials are delivered to the user dependant upon a given series of user factors, such as: background education, goals, learning styles to name a few. Authoring for these systems is already a complex and time consuming task for the extant user factors (as described in a systems User Model), to add additional user factors would increase this complexity and the advantages for doing this should be carefully thought through beforehand. To this end research into solving the authoring problems facing the AEH community has to be informed by the system requirements for the type of user adaptation involved.

With the widespread use of distance learning, and the many different learning systems (both adaptive and non-adaptive) that provide this service, the cultural background of a student may have a great impact on their ability and efficiency to learn a given set of content. Therefore it seems a reasonable conclusion that the user factor of *cultural background* should be added to an AEH's User Model. As stated above however any addition to the user model may greatly increase the *complexity of the authoring problem*, and any such addition should be carefully studied to see if this increase is worthwhile.

Within the domain of education, be it adaptive or not, there is little work that can be used to perform such a study. This paper address the lack of work in this area by examining factors behind the adoption of a cultural stereotype in AEH systems, and drawing conclusions for the already complex authoring issue.

Previously Hofstede [5] demonstrated that any given culture could be defined by their position on four indices. The Values Survey Module (VSM) questionnaire [6] allows for stereotyping a user within these indices and cultural 'zones'. This level of stereotyping has obvious applications to AEH: if a user's cultural values can be estimated through the use of a cultural stereotype then the AEH system can better adapt the web experience. For example this could be done by automatically, assigning a default cultural stereotype to a new user. This stereotype would obviously just be the starting point for the personalised delivery of content, but could take into account that an 'individualised' web experience may not be desired equally by all cultures. Some users may not want to be separated from their fellows in such a manner.

For the purposes of this paper five different cultures (as identified by the simplistic labelling of the students nationality) have been chosen and a comparison between them undertaken. This will allow us to determine if there are any significant differences between these cultures.

The rest of the paper is structured as follows: Section 2 introduces the questionnaire used to gather this data and the reasons behind its design. Section 3 presents the results from the questionnaire for the five cultures being examined in this paper. Finally section 4 discussed what these results may mean to the authoring of cultural stereotypes for AEH systems.

2. Why CAE?

The CAE (Cultural Artefacts in Education)[3] questionnaire is designed to gather the information required to determine if there is a cultural bias towards online education, specifically Adaptive Educational Hypermedia (AEH)[0].

This questionnaire is based upon the cultural indices of Hofstede and the interpretation of those indices relevant for web based systems as given by Marcus & Gould [7]. The user focus of the questionnaire is upon the Educational domain, hence students or researchers within academia. The reason for this is that Hofstede's VSM questionnaire [6] is designed to determine cultural values within a corporate setting. The CAE questionnaire is designed to investigate the following four hypotheses:

Hypothesis 1: Hofstede's cultural dimensions apply to the educational domain. Hofstede's cultural dimensions were extracted from data from the corporate world; can they be mapped from this domain to the educational domain?

Hypothesis 2: Students desire to be taught in the manner that they have been brought up with. Is there a cultural bias to education? Do students recognize this? Would they desire a different cultural bias to their own?

Hypothesis 3: A student's educational cultural bias is resistant to change. Do students adopt the local bias? (So, do Chinese students, when taken out of China, still behave like Chinese students?)

Hypothesis 4: There is a cultural bias in the acceptance of openly acknowledged Adaptive Educational systems. Is there a cultural bias in the desire for AEH – do some cultures accept the teacher's viewpoint no matter how it is presented and would therefore resent that being 'changed'. Can this adaptation be hidden and therefore accepted? Do students want to conform or not?

Both hypotheses one and three are not further discussed in this paper. This is because insufficient information has been gathered as yet to fully evaluate the impact of culture in answering these hypotheses.

There is sufficient data to perform an initial investigation into hypotheses two and four, and this will be the focus of the rest of this paper. Hence only questions 19 to 32 will be analysed as the previous 18 questions deal specifically with the hypotheses 1 and 3.

The questions used to examine hypotheses 2 and 4 are:

19. I would prefer to be educated in my own language.
20. Given the chance, I would prefer to be educated in another country
21. In choosing a university, the ability to practice languages other than my own is important
22. I respect the manner in which my teachers have taught me
23. I often feel constrained by the pace of my teaching
24. Different perspectives are important to me in my education
25. I enjoy experiencing other cultures

For questions 26 to 32, the students read a short text concerning adaptive educational hypermedia before proceeding; that text is:

“Adaptive Education System is a on-line system that will measure your personal behaviours and preferences, store them and use these to alter the nature of the education given to you. The aim is to deliver a personalised and unique education to you - and in so doing give you the best education you can receive.”

- 26. I think the idea of an Adaptive Education System is a good one.
- 27. I do **not** have concerns about the *type* of the personal data that is gathered.
- 28. *Security* of my personal data is of utmost importance.
- 29. I would rather that the lesson the teacher has written is not altered in any way
- 30. I would like to have control over the level of alteration that the Adaptive Education System makes
- 31. I would be very happy to receive a ‘personal’ education but only one approved by the teacher
- 32. I would prefer a personalised education even if it differs from that received by my peers

Each of these questions was answered using a Likert scale, as shown in table 1.

Table 1: the Likert scale used by respondents to the CAE questionnaire and the score assigned

Possible Response	Score assigned to the response
Strongly Agree	1
Agree	2
Neither agree or disagree	3
Disagree	4
Strongly Disagree	5

3. Survey Results

Sampling of students from universities around the world has taken place, from Hong Kong to Saudi Arabia to Ireland. The CAE questionnaire makes no distinction between undergraduates and postgraduates, but does record if a respondent is an academic. The initial sample size examined in this paper is 105 (4 of which were academics). These respondents were from a mix of cultures, ranging from German, to Chinese to Burmese – a total of 34 countries in total. The five countries chosen for further analysis in this paper are China, Great Britain, India, Ireland and Saudi Arabia, as they all passed the threshold for the numbers of respondents (i.e. $n \geq 5$). The numbers of respondents from each country are shown in table 2.

Table 2: the numbers of respondents (given by ‘n’) from the five countries examined in this paper

Country	n
China	5
Great Britain	26
India	11
Ireland	22
Saudi Arabia	5

An initial analysis showed that the majority of the questions gave a non-parametric spread of data. Thus a non-parametric test had to be used, in this case a Kruskal-Wallis (K-W) test. The goal was to determine if there was a statistical difference between each of the five countries’ responses to each question. The result of the test gives a ‘p’ value which indicates the significance of the difference between the sets of data within the group.

The Null Hypothesis for analysing these data was that there is no significant difference between each of the country’s respondents when it comes to answering the CAE questions.

The results from the K-W test for each question are shown in table 3. These results show that there exists a statistical difference (at the $p \geq 0.10$ boundary) for questions 19, 20, 21, 24, 25 and 29. Further information on the analysis for each question follows. The median scores used in tables 4-10, refer to the scores used in table 1.

Table 3: the CAE questions and the 'p' value (significance) determined from the null hypothesis using a Kruskal-Wallis test

Question	'p' value
Q19: "I would prefer to be educated in my own language."	<0.00
Q20: "Given the chance, I would prefer to be educated in another country"	<0.00
Q21: "In choosing a university, the ability to practice languages other than my own is important."	0.02
Q22: "I respect the manner in which my teachers have taught me"	0.15
Q23: "I often feel constrained by the pace of my teaching"	0.34
Q24: "Different perspectives are important to me in my education."	0.05
Q25: "I enjoy experiencing other cultures"	0.09
Q26: "I think the idea of an Adaptive Education System is a good one."	0.38
Q27: "I do not have concerns about the <i>type</i> of the personal data that is gathered."	0.37
Q28: " <i>Security</i> of my personal data is of utmost importance."	0.75
Q29: "I would rather that the lesson the teacher has written is not altered in any way."	0.09
Q30: "I would like to have control over the level of alteration that the Adaptive Education System makes."	0.11
Q31: "I would be very happy to receive a 'personal' education but only one approved by the teacher."	0.20
Q32: "I would prefer a personalised education even if it differs from that received by my peers."	0.19

Question 19:

Table 4: median scores and interpretation for Q19

Country	Median	Interpretation
China	3	Neither
Great Britain	1	Strongly Agree
India	3	Neither
Ireland	1	Strongly Agree
Saudi Arabia	3	Neither

There is a highly significant difference ($p < 0.00$) within the group of the five countries examined and their students' attitude towards being taught in a foreign language. In fact two groupings of countries becomes clear (table 4), with China, India and Saudi Arabia all having similar responses and a median score of 3 (neither agree nor disagree with the statement). Great Britain and Ireland both have a median score of 1, strongly agreeing with the statement. So

whilst the language of choice for teaching is irrelevant for students from China, India and Saudi, it is an extremely important issue for the Irish and British.

Question 20:

Table 5: median scores and interpretation for Q20

Country	Median	Interpretation
China	2	Agree
Great Britain	4	Disagree
India	2	Agree
Ireland	3	Neither
Saudi Arabia	2	Agree

Again a very highly significant difference ($p < 0.00$), with table 5 showing the median for Irish students is 3, indicating that these students are indifferent to being educated in another country. Compared to the British, where the median is 4, signifying a high level of disagreement with the statement, and are significantly more likely to consider language an issue when choosing a university. The Chinese, Indian and Saudi Arabians all have a median of 2, showing that there are more open and desiring for an education in another country.

Question 21:

Table 6: median scores and interpretation for Q21

Country	Median	Interpretation
China	3	Neither
Great Britain	4	Disagree
India	2	Agree
Ireland	4	Disagree
Saudi Arabia	2	Agree

The 'p' value of 0.02 shows that the differences in response to this question are also highly significant. The Irish and the British demonstrate that they are not concerned with practising languages other than their own, whilst the Indians and Saudi Arabians have a preference for doing so. The Chinese respondents show no preference one way of the other; this issue seems of little importance to them.

Question 24:

Table 7: median scores and interpretation for Q24

Country	Median	Interpretation
China	1	Strongly Agree
Great Britain	2	Agree
India	1	Strongly Agree
Ireland	2	Agree
Saudi Arabia	2	Agree

The median scores for this question (table 7) show that there is general agreement to this statement but the 'p' value of 0.5 shows a significant difference between the degree of agreement. The Chinese and Indians both consider different perspectives a very important factor, moreso than the British, Irish and Saudis. Considering the results from question 21, and that this question deliberately makes no mention of different *cultural* perspectives, we can infer that the Indians consider different cultural perspectives particularly important, whilst the Chinese consider any type of different perspective important, be it cultural or not.

Question 25:

Table 8: median scores and interpretation for Q25

Country	Median	Interpretation
China	1	Strongly Agree
Great Britain	2	Agree
India	2	Agree
Ireland	2	Agree
Saudi Arabia	1	Strongly Agree

Again the medians shown in table 8, indicate a general agreement between the five countries, and once again the 'p' value of 0.9 shows a significant difference between the level of agreement. In this case however it is the Chinese and Saudi Arabian respondents that both strongly agree with the statement that they enjoy other cultures. This issue is of lesser importance to the other countries.

Question 29:

Table 9: median scores and interpretation for Q29

Country	Median	Interpretation
China	4	Disagree
Great Britain	3	Neither
India	3	Neither
Ireland	3	Neither
Saudi Arabia	4	Disagree

The median values shown in table 9 indicate an interesting significant difference ('p' value of 0.9) between respondents for this statement. The British, Indians and Irish all have no strong feelings concerning the alteration of lessons. However both the Chinese and the Saudis are in disagreement with this statement.

The rest of the questions asked showed no significant differences between the countries, however lessons can still be drawn from their uniformity of responses. The median for each question is shown in table 10, the median shown is calculated by examining all of the medians from each country in each question.

Table 10: median scores and interpretation for all other questions not previously examined

Question	Median	Closest Interpretation
Q22	2	Agree
Q23	2.8	Neither
Q26	2	Agree
Q27	3.6	Disagree
Q28	1.6	Agree
Q30	2	Agree
Q31	2.2	Agree
Q32	2.4	Agree

These results will be further discussed in the conclusions.

4. Conclusions

In investigating hypotheses two and four (proposed at the beginning of this paper) the similarities and differences between the responses given by respondents from the five countries analysed are equally important. For example, Chinese respondents appear to be unconcerned with issues of language but enjoy the prospect of experiencing different environments and cultures. Compare this to both Indians and the Saudis, who would consider the fact that they could practice a foreign language an important issue (whilst being indifferent to being taught in their own). All three of these countries differ markedly in these responses to both Britain and Ireland, both of whom have very strong feelings about being educated in their own language and do not consider practising another language a factor when choosing where to be taught. These answers help guide us towards answering Hypothesis 2: “*Students desire to be taught in the manner that they have been brought up with*”. The influences here are not only the students’ original language but their openness to experiencing different cultures. Questions 20, 24 and 25 help elucidate their responses to this issue. All three of these questions show significant differences between the countries involved. Students from China, India and Saudi Arabia all indicating that they would desire to be educated in a manner *different* from that they have been brought up with. Compare this response to that from Britain, where students, whilst being open to different cultures, would choose to be educated in the same manner. The Irish are almost indifferent to this issue, siding very slightly towards a different approach. Therefore for Hypothesis 2, it would seem that China, India and Saudi Arabia would refute the hypothesis, whilst Britain would accept it and Ireland would ideally require further data before an accurate conclusion could be reached.

This of course can have major implications in designing and authoring for AEH systems. If a system was to adapt the content to be given in the home language of the student then students from India and Saudi Arabia may feel that they were not gaining as much from the experience as they might otherwise get from being taught in a non-adaptive off line environment. On the other hand a system would be best designed to always offer British and Irish students the content in their home language. Hence any author for a given series of content may well *not* have to have create as many different language versions as there are nationalities involved in a course. For example, where a student from China is educated in India, presenting the content in Indian would be a reasonable start to their education. Obviously all of these initial stereotype values should be able to be changed by the user as required.

Hypothesis 4 states that “*There is a cultural bias in the acceptance of openly acknowledged Adaptive Educational systems*”. Generally the data gathered seems to be similar across all of the cultures investigated: all agree that the *idea* of an AEH is a good one, but that they should have control over the level of adaptation. It seems that no student would trust an AEH system fully to control their education, and that the adapted lessons should definitely be approved a teacher with obvious implications for the authoring load at the lesson authoring stage. The response given to question 29, shows that both Chinese and Saudi Arabian students would actually prefer a lesson to be altered from that originally given by the teacher (with the above conditions) and students from the other countries are indifferent. Again the conclusions for authoring here are plain, if a system were to implement cultural stereotyping to influence the initial stages of adaptation in the system – then it seems that students from China and Saudi Arabia would prefer the adaptation to occur straightaway, as long as they were assured of the quality and teacher approval. Compare this to students from Britain, India and Ireland who it might be best to give a generic non-adapted lesson as their initial introduction to the content – with adaptation being introduced at their request or at least with their approval.

Hence in our investigation of Hypothesis 4, it seems that whilst there is a great degree of acceptance of AEH systems (with certain conditions), there is in fact a difference between the countries analysed. This would seem to accept the hypothesis. This hypothesis identifies the ‘*openly*’ acknowledged adaptation – it may well still be advisable to conduct some form of adaptation even if the student would seem to desire otherwise. For example British students are

indifferent to the fact that a lesson may or may not be altered – however an AEH system should ensure that the content is only provided in English.

It is also important to note that within this paper the term ‘cultural’ has been used to synonymously mean ‘country’, this is not always the case and future work should consider this. In addition a further goal is to gather more respondents to the CAE questionnaire. With more data it will be possible to identify the educational values of more cultures.

As can be seen from the above analysis, identifying these values will be of great importance to the AH/AEH communities, specifically for the authoring/creation of content. As with this knowledge it will be possible to author the required levels of content that pre-adapt the presentation of web based materials with only the student’s culture/country known.

This has the additional side benefit that it may simplify authoring as no additional questionnaires, no time consuming discovery process would be required, for either the student nor the author (in the creation of these questionnaires). Instead the student would receive content in a manner appropriate to their cultural background. However it is important for authors (and system designers) to note that students should be able to be over-ride these settings themselves.

This paper presents the first results from the CAE questionnaire designed to identify the cultural values of members of academia, and specifically how these values may influence the authoring process.

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