Developing self-searched curriculum based on epistemic queries

Parthasarathi Banerjee
NISTADS, Dr. K.S.Krishnan Road, Pusa
New Delhi – 110012, India
Tel: +91 11 576 537982
Fax: +91 11 575 4640
psb_nist@yahoo.com

Abstract
Contents put up in disjoint sites in hypertexts are costly though multiple and repeated use of these contents by globally distributed self learners remain limited owing to limitations in methods available to navigate the hypermedia. This results in failures in developing a curriculum by a self-learner and in limited use of contents. A learner-centric approach towards the solution of this problem has been approached in this paper. A learner has a feeling for a knowledge of which she has a metarepresentation. This metarepresentation guides epistemically and also through aspects of logic and semantics, the navigation of a learner who attempts at developing a meaning fulfilling and satisfying curriculum through her own associational acts of assembling contents from over sites. It is suggested that such a subjective epistemic navigation can be complemented if also contents put up ontological tags. A curriculum then can remain guided initially by ontological pre-commitments followed by epistemic feeling-based subjective navigation. A learner can then associate meaningfully disparate contents from the hypermedia.

Keywords
Curricula, Web sites, Metarepresentation, Learner, Content

Introduction
The WWW is a growing storehouse in hypermedia of HTML pages, with contents superbly diverse and rich. Websites and pages on those, especially content pages of curricula developed by a widely distributed and uncoordinated bevy of specialists, are costly. Very often large amount of intellectual labor went into making those pages. However, visits to these sites and use of these pages by knowledge seeking individuals remain low and erratic. There could be several approaches in overcoming this barrier to use, such as developers of sites and pages themselves through forming consortia might design curricula and offer in an e-commerce mode the courses so designed to learners; or else, the process of designing web pages could be based on ontology or the browser could be enabled with advanced features such as incorporation of browsing history. These approaches however, take the web developers’ perspective. This paper takes up the client’s or the learner’s perspective. It is assumed that a learner wishes to acquire knowledge on either a subject or on a query; and the learner has a browser. We understand that the learner while navigating learns more about what to know and s/he cannot access the counseling or the guidance of an expert teacher. The learner develops a self-searched curriculum through creation and interpretation of an internal metarepresentation. This internal metarepresentation acts as a logical or epistemic guide, related to though not necessarily expressible as linguistic utterances, and this epistemic quasi-perceptual internal feeling guides the learner in searching, accessing or rejecting, linking, updating and finally integrating as a new whole the otherwise dispersed HTML pages. Learner develops epistemically a self-searched curriculum, and in this paper we explore situations, which are conducive to the development of such curricula. In particular, certain ontological characteristic or other features of the web pages assist the search of a learner. In other words, pages can be so designed as to assist a learner in associating disparate sites with epistemically coherent contents.

Background
The relation between learning and curriculum has assumed now a new dimension. Internet based learning has an anonymous learner and an anonymous instructor. Anonymity has been defined as “noncoordinatability of traits in a given respect… this definition...(frees) it from its primary association with naming.” (Wallace, 1999: 25) Traits or textual features that cannot be coordinated and which remain in hypermedia search space, can thus be termed as anonymous. Thus, such textual features as are unrelated definitionally or ontologically, could be termed as anonymous. In hypermedia, it often happens so that texts that are in reality on the same definitional or ontological domain have not specified such common definitional links, and as a result, such texts if searched
through hypertextual links cannot be received under the same category of search. A learner then cannot link these texts on an ontological plane. Such anonymity of texts then lead to loss of textual material, and consequently texts belonging to the same subject domain remains beyond the hyperlinks of search. Search fails in an anonymous space. Consequently a curriculum fails to develop. Building up the texts with clear ontological links (Benjamins, Fensel, Decker & Perez, 1999; Gruber, 1993) offers one solution though it assumes beforehand that persons who were in a group as it were developed the texts. Web however, offers unrelated persons, scopes to offer texts and such texts cannot offer a priori ontological links. This failure can however be partially addressed if the epistemic queries are taken into account.

Received literature from philosophy defines ontology as commitment to foundational concepts. Ontology, in the context of information systems, has been defined in terms of pre-specified conceptualisations and the relations between such concepts. It assumes therefore a pre-commitment by a group of individuals to such concepts as object, etc. Necessarily such an ontological commitment is group-based and in the context of hypertexts, this group refers to the developers of hypertexts, who put ontological tags on texts. The navigator learner however, cannot share with the texts developers such tags beforehand. Moreover, the learner is alone in searching and she therefore can at best commence a search from a particular belief in ontology, which belief may not be sharable with the commitments of text developers. In fact, the learner would not know such conceptual foundations of what she wishes to learn. She would have either a set of utterable queries, or, most often, she would have a ‘feeling’ for some unutterable queries. The received literature defines knowledge as epistemic if it is driven by specifiable queries. We extend this definition of epistemology, in the context of web, to such query-driven navigations as are not specifiable beforehand. That is, we assume that a learner would most often have a feeling for knowledge, a search for what cannot be specified or uttered by the learner in unambiguous terms. Such searches however, are driven by query-likes, and are thus epistemic in character.

Pedagogic understanding compels a real relation between the learner and the instructor where the relation is established through the question-answer or doubt-resolving mode. Learner in a classroom or else in a situation that offers interactivity between the learner and the instructor has the scopes to raise queries and thus a learner can hone the content based on epistemic search. Dialogues of Plato thus established knowledge, carried through certain content, on the platform of epistemology, which is on the knowledge-seeking queries. Knowledge-contents, exemplified in the curriculum, is then a function of both what the instructor intends to offer and of the epistemic queries of the learner, exemplified in the relation between the learner and the instructor. In hypertextual search, a learner however, cannot seek the support of an instructor. There are many anonymous instructors on the web and each with different objectives and pedagogic philosophy intends to offer contents. Thus a learner is not afforded either a query support provided by an instructor or a coherent ontologically related or content-wise related hyperlinked texts. Such a situation calls for epistemic solution to building up of curricula. This paper defines curriculum or content, as collected from websites, as a function of epistemic queries; and it provides following a review of the pedagogic principles and an analysis of the principles of content-organization, a schematic methodology of developing contents through a web-search procedure.

Argument

A hypertextual self-built curriculum or the content of knowledge then cannot be built upon a function of ontology alone since ontological links are often missing. Moreover, unlike an instruction-led building-up of curricula, which is a function of social or discourse situations, the learner searched self-built curricula cannot be a direct function of discourse situation. Especially when we consider that learners on hypertext media are often from cultures distinctly different from the cultures of those who had put up contents on the web. As a result the common sharing of discourse situations recedes to the background. Received theories imply a strong dependency of content of curriculum on the ontological or constructive social/discourse relatedness. This paper argues that curriculum is first; a function of epistemic queries and then, it can acquire social discourse significance as well as ontological significance. Further, we argue that Internet based learning ought necessarily to be driven by epistemic queries. This epistemic necessity follows from the fact that unlike an instructor-led school-like curricula where direct non-anonymous relation between the learner and the instructor prevails and where problem-solving skill gets a precedence, an internet-based curricula is borne out of choice and queries. The learner establishes anonymous and hypertextual relation with an abstract instructor based on queries that are not ontologically defined, nor meant primarily for problem solving, nor even constructively evolved through interactions between the abstract instructor and the real learner.

Moreover, websites offer to a query umpteen number of choices or menu. These choices are not structured around traditional disciplines of knowledge. University system of pedagogy has been built around disciplinary
structures that have been providing curriculum defined as disciplines and based mostly on social constructive discourses. Internet, on the other hand, is driven by a search based primarily on key words chosen on queries of the learner. It provides choices over millions of possible contents, none of which are structured around disciplinary structures. Keywords though often have ontological or discourse significance. Very large numbers of possible contents raise the crucial question of an organizing principle of knowledge without which these contents cannot be either organized or even accessed. Internet offers a true inter-disciplinary platform. This paper argues that the content organizing principle has to be defined on the queries of the learner, that is on epistemic grounds. There is however, a limitation since the current search methodology is dependent on keywords or discourse-analyses structure. We point out the limitation of organizing knowledge in file-structures. The current method of organization as well as the search procedure smacks of the tradition of searching archives, containing documents in written alphabets. This paper does not propose to offer a novel epistemic solution to both the problems of curriculum organization and curriculum search. However, it points out through a review of pedagogic traditions the limitations on such a search procedure. The proposed schematic search procedure to construct a curriculum is therefore limited in scope since it has to recognize the current search algorithms.

A comparison of epistemic pedagogy with pedagogies from the received theories, namely constructivism, behaviorism and cognitivism is presented. Bhatnagar argues (Bhatnagar, 2000) that constructivism is a theory of how people learn, sharply in contrast with the earlier behavioral theories that advocated “direct instruction,” “behavior modification,” and “explicit teaching” as a means to designing instruction. Constructivism, behaviorism and the cognitivism assumes a priori existence of a social interactive situation between the learner and the instructor, though the interaction can be mediated through internet. Social situation of discourse constructs the epistemic queries under such a situation or else, a socially evolved cognitivism assists learning. Hypermedia self-search does not offer such situations. Individual is at its core. Therefore analytical instead of constructivist mode seems to be appropriate to understand such a hypermedia search. We argue, following Sperber (Sperber, 2000), that individually held metarepresentation of a ‘feeling’ and not of a ‘cognition’, guides the search and consequently the ‘feeling’ assists the development of a file of contents. This internal metarepresentation acts as a logical or epistemic guide, related to though not necessarily expressible as linguistic utterances, and this epistemic quasi-perceptual internal feeling guides the learner in searching, accessing or rejecting, linking, updating and finally integrating as a new whole the otherwise dispersed HTML pages. Traditional understanding on epistemology defines it as the mode of knowing, especially as resolving doubts through raising ‘utterable’ queries. Therefore, clarity on questions and doubts are assumed to be a priori. Epistemology is then utterable. However, we extend this definition of epistemic practice beyond clear utterable cognitions into the domain of ‘feeling’. This unutterable feeling guides a set of queries and the knowledge-seeker remains unsatisfied till the felt doubts, which are cognitively not known to her/him, are resolved. Self-learning, we argue, is founded on such extended sense of epistemology. A self-learning based upon non-problem solving epistemic queries on websites and upon anonymous non-interaction, will have to necessarily devise epistemic principles of content-organization and content-access.

A web search is based upon one of the following modes: keyword, concept, relevancy ranking, or meta tags; or through wrappers or mediators (Wiederhold & Genesereth, 1997), and sometimes through domain ontological links which shows up the content of the information sources. These are the existing modes of web-searches. A basic chart describing the development of a self-searched curricula can be now presented. The learner does not ‘know’ (cognitively, that is she cannot speak out) her specific queries; she has a ‘feeling’ about what she wants to get satisfied by. She has a metarepresentation of her queries. She navigates the web epistemically. In order that she can search quickly and effectively, we suggest initial support of navigation by ontological tags. Typical steps involved in a search are:

- automatically search for document
- get the set of relevant links
- get the set of relevant documents
- parse the documents to text
- extract the most meaningful sentence from the document, and
- remove the redundancy from the final document.

Typical solution architecture defines three phases of search: stage, parse stage and collator stage. The last stage consists of phases with the aim to reduce the given set of documents into a single document. This paper concludes by comparing epistemic searches with such approaches as above, including push and pull technologies, and provides a simple schematized solution to building up a curriculum based upon epistemic searches, assisted initially by ontological tags, of websites.
Delivery Modes on the Web

Commercial web sites can be categorized in following types (Hoffman, Novak & Chatterjee, 1995; Patnayakuni & Patnayakuni, 1999): online storefront, Internet presence, contents, mall, incentive sites and search agents. This categorization helps differentiating the content from how these contents are maintained through some mode of payment. A learner would mostly use the ‘pull’ model of information delivery. In this model, in contrast to the ‘push’ model where information is delivered to an user having an history of using, the information seeker seeks information from sites. The user has to install software which takes up the task of collecting information; and several ‘intelligent agents’ have come up in recent years (OECD, 2000; Lawrence & Giles, 1999) to assist the user in automatically downloading information content from the sites. However, most such developments have taken place in the commercial areas and a learner cannot perhaps make use of this mode particularly since it would require a pre-specification of learner’s queries in definitional terms. Unfortunately, in most instances a learner would not know beforehand the definitional or ontological information contents of the curricula that s/he wishes to develop. As a result, uses of these methods remain limited in scope for a self-learning learner on the hypermedia.

Contents available in hypertext can be accessed through either ‘association’ or through ‘connectivity (Bardini, 1997). A classification of approaches towards accessing hypermedia contents, as summarized by Bardini, is: hypertext contents are non-indexed and are associational; ideas are represented non-sequentially; content is not bound by linearity, structure and organization. De-emphasizing organizational aspects of knowledge organization is a critical aspect of this associational view of navigating knowledge. This perspective provides freedom to the learner navigator to associate freely chunks of knowledge contents, in line with her navigational epistemology. A subjectively driven epistemology, this associational perspective, allows scrutiny of its personalized organization of several knowledge contents in terms of a subjective logico-semantic examination. Social modes of knowledge organization, such as exhibited in disciplines of study or in an instructor-developed curricula or university designed courses or even a firm-internal knowledge database – is relegated to a secondary position in this subjective associational mode of organization of knowledge. It cares for an epistemic entailment and a logico-semantic examination that is entirely personal first, and only secondarily such an organization, the developer puts to examination by facts of life-world. Our use of subjective epistemology in terms of metarepresentation is essentially associational; and we elaborate further on this aspect later in this paper.

Another set of approaches, which consider important the engineering aspects and the networked aspects of hypertexts (Halasz, 1988; Smith & Weiss, 1988; Conklin, 1987), can be summarized as: hypertext is a form of managing electronic documents through a network of electronic nodes and links; it is a form of directed graphs where each node of the graph is a chunk of text, related to similar other chunks through links; such a nonlinear representation can be traversed at will and in any desired direction. These groups of definitions emphasize network links and connectivity. In fact the latter development of linking through ontology (Farquhar, Fikes & Rice, 1997; Gruber, 1993) is an outcome of this connectivity approach. Connectivity approach emphasize organization of knowledge, based as it should be on definitional and identifiable social organizational mode such as an intranet, and identifiable links that can be re-traversed by any other navigator. A self developed course by a learner would be accepted as a connected text, that is a text which can be prepared as well by another learner and which can stand the scrutiny of social examination regarding its knowledge organization. Thus any curricula are apparently not acceptable from this connectivity perspective.

Learner as the Engine

The web-site centric designing of information delivery through either of the above methods ignores the learner as the engine of queries and hence of the hyperlinks, associations or redundancies. A converse approach based more on the information pull mode, would have to examine whether the information pull queries of a learner are derived from out of an internal mental process of the learner. This would refer to aspects of navigation. In ordinary etymological sense navigation refers to a real physical environment, where a navigator searches for landmarks, beacons based more on memories of earlier navigations, and sometimes on cognitive capabilities. Searches of a navigator are based on Euclidean space, whereas navigation as distinct from such a search is based on a non-Euclidean space of hypermedia. The latter is an evolving space of links and associations, of graphs and cognitive or ontological links. A navigator cannot merely search for an item known beforehand; in contrast s/he learns about the space while simultaneously creating and interpreting an internal model of the navigability of that space. Spence (Spence, 1999: 920) defines “notion of navigation as the creation and interpretation of an internal model…..(which) suggests the extension of such a definition, not only beyond physical and simulated Euclidean
This approach is burdened with cognitivism. Spence (Spence, 1999) employs a four-stage model: browsing, content elicitation, formation of internal model and interpretation of internal model with elicited data. A browsing in this framework can be caused by a conscious search for a wanted text/data, or else, as happens in a serendipitous search, it can be actuated by an opportunity provided by glances at the perceptually attractive sites. The latter is therefore influenced much by visual representations (Scharl, 1999). A learner in this latter case takes upon a situated action (Suchman, 1987) perceptually initiated by some site. Chen and Rada (Chen & Rada, 1996) propose a model for such situated actions in collaborative hypertext databases. However, in the former case the learner is supposed to possess an awareness of what s/he is looking for. Such an awareness or cognition of definitional or ontological aspects of the possible curricula however, may not often be available to a learner, especially in situations where the learner is novice to the field of enquiry that interests her/him. A learner who is aware of the field of enquiry, and who therefore can formulate a strategy and can evaluate progress achieved having undertaken that strategy, can afford this cognitivism. Such a learner possesses a priori knowledge of at least the definitional aspects if not of the desired content. Our learner is however, cognitively deficient. Internet for this learner is like an uncharted domain from where the unutterable and unrecognized ‘feelings’ within her/him would be able to secure knowledge contents. This learner does not ‘know’ about the definitions or ontology of the ‘felt’ beforehand; neither therefore a visual perception of a site even while attractive can guide the queries of the learner.

A serendipitous browsing may hit sometimes a site with contents of interest to the learner. The learner in such a situation may find such content akin to the ‘feelings’ s/he has been having, and a hit like this can then be learned by the navigator, memorized and reused as an initial quasi-strategy of latter navigations. In fact the web browser, which is a key interface to browsing, can be designed to assist and facilitate browsing. An online history tool, MEMOS, has been suggested (Head, Archer & Yuan, 1996) which would incorporate the browsing history. Learner, with or without a cognitive appreciation of possible contents, may then be assisted by its own history of successful navigation. It also corroborates the mental model schema discussed earlier (Spence, 1999) since such a model of navigation upon interpretation of available data/content along with the mental model, formulates a browsing strategy for future navigations in building up its own curricula.

This kind of cognitive approaches to navigation, assisting the learner to formulate strategy and solve problems disregard however, the emphases that it laid upon connection. A connection is intrinsically related to the intentions of the navigator or interpreter of a communication (Bardini, 1997) or else it is related to the interpretation of relevance of a communication (Sperber & Wilson, 1995). A learner would be able to connect apparently disjoint pieces of contents/sites provided she had beforehand the intention or the competence to connect. Such a competence to intend may be expected of a person who either knew what she wanted to achieve or else, for whom anonymous pieces of hypertexts could constitute a meaningful series of communications. However, to regard hypertexts as sequenced communications would be improper. In fact most of our problem should have ceased to exist then. Alternatively, an association approach (Bardini, 1997), which allows free play of imagination to the navigator in associating apparently disjointed pieces of contents/sites to make meanings or a new curricula, does not demand an intentionality or a competence to intend from the learner. A learner associates several pieces of content in a composition, discards a few pieces of contents and then renews or revises any pre-existing composition. Meaningfulness of the overall emergent composition, in contrast to any cognitive economy needed in deciphering intentionality or in contrast to any competence to infer likely linkages from out of an existing content, stands out; and we emphasize this emergent meaningfulness as the key as well. Meaningfulness of associated disjoint-contents stand on the back of metarepresentation.

**Meaningfulness as Epistemic Key**

Sperber argues (Sperber, 2000) that humans are expert users of metarepresentations. Metarepresentations are representations of representations, especially those with the capacity to represent the content of representations. In contrast to linguistic competence developed in response to decipher meaning and relevance of a communication, a metarepresentational competence enables making inferences from situations involving not communication per se but such facts as competition, cooperation, exploitation, etc. Sperber argues “metarepresentational sophistication allows a form of inferential communication independent of the possession of a common code. This….can take advantage of a code…..even if the signals generated by the code are ambiguous, incomplete, and context-dependent” (Sperber, 2000: 7). Thus a metarepresentation enables making inferences from situations that are not of communicative utterances type, such as prevails on the web, but it
assists inferences from context-dependent and ambiguous situations, which again are prevalent on the web. Anonymous writers whose intentions are not decipherable due to lack of communication have written content sites. Contents are context dependent, related to the sites and are accessible through links provided by the search engines. Till the contents are read and understood, a site is ambiguous as well. Thus drawing inferences from an accessed content would depend more on metarepresentation than on any linguistic competence.

Sperber discussed about three types of metarepresentations: mental, public and abstract. Representations in the abstract domain, for example, can be reduced to their logical, semantic and epistemic aspects. These representations can be checked for their such characteristics as true or false, plausible or implausible, standing in relationships of entailment, etc. A learner can have mental states corresponding to mental representations, can interpret public representations or can self-reflect on the abstract representations. A navigating learner upon hitting a content and upon interpreting that content, would look for the logico-semantic coherence. Then these coherent and emergent aspects could be compared epistemically with the abstract representations she has been having a feeling about. S/he has been feeling for a broader and more complete picture of curricula with several contents; necessarily about which s/he has been holding beliefs regarding epistemic and logico-semantic coherence. A single hit at a content/site entailed or implied for her possible sites/contents that would offer missing components. The learner thus looked for a fulfillment of a metarepresentation. This is not a mental model, which the learner constructed consciously; neither is this an ontologically related set of contents. The learner could not have spoken about it either since metarepresentation was not linguistically utterable or communicable. Moreover, from a single hit at content this learner could not decipher the intentions of the content-writer.

Therefore what she has been feeling and what she could not have known verbally, emerges from a search for coherent meaningfulness, logicality and epistemic entailment. This emergence is thus dependent on a plenty of rejections (owing to logico-semantic or epistemic incompatibility) of contents that she chances to hit. It is also dependent upon acceptance of contents and/or revisions and adaptations, etc of contents. Emergence to the learner is signified by the emergence of meaningfulness. This emergence has been caused by the feeling of metarepresentation. The feeling in turn must have been caused by social situations of competition, cooperation, exploitation, etc. A learner desiring to improve her situation felt for knowledge – she felt that a curricula would help her improving her social situation. However, she could not know the curricula and she could not speak about. In a typical school-based teaching a learner is instructed. On a web, this situation of instruction does not prevail. Here the learner is led by her own unspeakable feeling of metarepresentation. The latter guides her epistemic queries. Epistemic entailment leads her to look for meaningfully associative contents on disjoint sites. A learner is thus entirely free to choose, that is to possess independent epistemic navigations. She is also free to associate contents in her own fashion. A learner acts on the curricula development and she is gifted with a meaningful curricula.

**Ontological Cues on the Content**

A metarepresentation led development of curricula, as argued here, is satisfying to the learner. The learner perceives a social situation of competition, cooperation or aggression and in order to better her social position, she wishes to learn. Curricula developed by her, she believes initially based on epistemic entailment and on logico-semantic aspects, to be meaningful. Meaningfulness in this context implies a pragmatic concern, namely the belief that contents associated by the learner would satisfy her requirement. This belief leads the learner to the actualities of life-world where she tests the efficacy of the contents of the curricula in terms of the degree to which this curricula can be satisfying. Therefore associated contents are examined by the learner herself in the marketplace of life but at a later period. She cannot depend much upon the history of her own past experiences of associative epistemic navigations since each time she develops a curricula anew. Moreover she cannot either fall back upon a socially secured form of knowledge organization, since we are assuming that disciplinary divisions of knowledge are falling apart, universities are losing control, company data bases are private and internal, and the learner cannot interact with either the developer of contents or with an instructor.

Such a situation as here, run according to personalized epistemics and misrepresentation alone, would then have to await a latter examination by social institutions regarding the ability of the curricula to be satisfying. However, an organized mode of knowledge delivery as for example prevail in university or in a company-based knowledge data-base system, delivers a curricula which is already examined as regards efficacy. We may then consider a situation where a better interface than exists now can be designed between the association mode of learner-developed curricula and the connective mode of ontology-linked or instructor-delivered pre-tested curricula. We envisage a situation where content-developers develop contents with certain ontology links. In that case, contents
developed and put up by persons though apparently randomized in actuality have followed certain common ontological premises, leading to a situation where developer-provided ontology would have to search for harmony with epistemic and logico-semantic aspects of the navigator learner. Simpler and common forms of search used by an ordinary learner and commonly entertained by a search-engine, are based on keyword searching, concept-based searching, relevancy ranking and meta-tags. Essentially statistical occurrences are used, as for example: a marked web page would be modeled after noting the frequency of occurrence of all the stored words. Relevancy of the page would be measured using a weight function. The engine then accesses relevant documents and these are parsed in order that texts are obtained, from which most relevant pages appear following removal of redundancy, on the interface the learner is using. These statistical procedure, most commonly performed by a search engine, would not allow the ontological links till these are designed so.

Gruber defines ontology as a specification of a conceptualization (Gruber, 1993). It is a description of the concepts and relationships that might exist for a group of single agent(s). It relies on ontological commitment regarding conceptualization in terms of such items as objects, concepts and other entities and their relationships. It is assumed then that agents who wish to share or exchange knowledge do also commit to the specified ontology or else take guidance of that ontology. It would be easier to conceive of an ontology shared in an intranet or by users who share certain common social commitments as regards the texts they develop. Such a common concern can be shared at the levels of information ontology, which describes the information meta-model, or at the level of domain ontology, which describes the content of the information source (Abecker, Bernardi, Hinkelman, Kuhn & Sintek, 1998). However, both these are appropriate to a set of agents developing contents who share explicitly known frameworks of ontology. In a situation where content developers are from diverse backgrounds and where they have diverse disciplinary objectives and commitment, this ideal of shared ontological commitments appears to be a distant dream.

As a compromise, we may think up of situations where developers of content pre-specify a certain degree of disciplinary ontological commitments. This case then assumes that since all the content developers have been instructed through disciplinary mode of instructor-led teaching, they would in all likelihood have a predisposition to and perhaps a dependence on existing disciplinary commitments. Similarly the learner navigator too has been brought up in a disciplinary environment and in all likelihood she would be guided by her earlier ontological beliefs. As a result a case exists where both the agents, namely hypermedia learner and the hypertext developer, share a common origin and vestiges of a common set of ontological beliefs. The learner in order to look for epistemic entailments and meaningfulness would be initially guided by prior ontological beliefs. If then, the content developers provide disciplinary-ontological tags, there would be a meeting ground from where the navigation would commence. Such an initially guided navigation, linked to ontology, however, would not derail the learner from her epistemic metarepresentation. She begins from the ontological beliefs, get connected initially to ontological links, and then commences associating newer contents through feelings that are present in her own metarepresentation.

**Conclusion**

We looked into the development possibilities of curricula by a learner unassisted by any instructor or without having any links to any organized learning, from navigation of hypermedia. It was observed that the learner wishes to develop curricula according to feeling, of which she has a metarepresentation and which she can examine through such aspects as epistemic entailments and logico-semantic coherence. This feeling of the learner guides her to attain meaningfulness through iterated navigation of contents distributed over the hypermedia. Learner associates several diverse, dispersed and definitionally unlinked contents through such an epistemic navigation of the web space. A learner puts a break to navigation when she believes that the associated contents have given shape to a satisfying meaning, and this stage of documented meaning of associated content pages she describes as a partially complete curricula. The test of a meaningful curricula is however, performed in the real life world of the learner through examining the efficacy of the curricula to bring the learner the desired goods. Incompleteness of a curricula, when observed by the learner, would lead her to recommence navigation. This mode of subjective association of content pages based on metarepresentational rationality would however remain a weak performer, since common searches are based on statistical preponderance or else on ontological links. We suggested that since both the content developers and the navigator learner share a common history of instruction in disciplinary ontology, the contents could initially be developed with ontological tags which might assist the initial navigation of the learner who only later take upon navigation based upon epistemics of metarepresentation.
References


