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A Survey of Student Counseling Systems: Functions, Designs, and Interactions

Yun Wan

University of Houston - Victoria, wany@uhv.edu

Sri Vishnu Gopinathan

University of Houston Victoria, gopinathans@uhv.edu

Palvi Aggarwal

University of Texas, El Paso, paggarwal@utep.edu

Sherrene Bogle

Cal Poly Humboldt, sab30@humboldt.edu

Shebuti Rayana

SUNY College at Old Westbury, rayanas@oldwestbury.edu

See next page for additional authors

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Authors

Yun Wan, Sri Vishnu Gopinathan, Palvi Aggarwal, Sherrere Bogle, Shebuti Rayana, and Xiwei Wang

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TREO Talk Paper

Yun Wan

University of Houston Victoria
wany@uhv.edu

Palvi Aggarwal

University of Texas at El Paso
paggarwal@utep.edu

Shebuti Rayana

SUNY Old Westbury
rayanas@oldwestbury.edu

Sri Vishnu Gopinathan

University of Houston Victoria
gopinathansv@uhv.edu

Sherrene Bogle

Cal Poly Humboldt
sherrene.bogle@humboldt.edu

Xiwei Wang

Northeastern Illinois University
xwang9@neiu.edu

Abstract

Information systems have been playing an increasing role in higher-education student counseling, assisting human counselors and student self-assessment. In comparison, there is relatively less research in this field. In this conceptual study, we surveyed existing research on student counseling systems from AIS, ACM, and IEEE digital libraries, aiming to identify the covered topics and research gaps. Through a keyword search (student AND counseling system) in these digital libraries and removing duplicated and irrelevant references, we identified a total of 49 papers. These papers were classified and reviewed based on their contribution to student counseling systems' functions, design & algorithms, and user interface & interaction mode.

We found *academic*, *career*, and *psychological counseling* are the three major student counseling system functions being studied. We found 40% of the surveyed literature focused on academic counseling systems. Academic counseling could be further classified into *curriculum counseling* and *performance counseling*. Most career counseling systems surveyed used student inputs for customized services. These inputs vary in categories from a personality trait or interest to academic achievement or potential. The output of a career counseling system is mainly focused on career advice, with a few extended to college readiness and selection. The emotional and psychological challenges that students face nowadays are of great concern to higher education. The literature indicated successful psychological counseling systems must be accessible to students to allow them to request and track the services, attend counseling sessions, and view results.

We identified a wide spectrum of machine learning algorithms explored or used by student counseling systems in the surveyed literature. The top four methods, regression, decision tree, nearest neighbor, and fuzzy logic, consisting of 55% of the literature. Fuzzy logic was the most frequently used or proposed method in the survey literature (16%). In contrast, neural networks, including deep learning and natural language processing, are relatively less explored (12%). We found the utilization of deep neural networks, especially the most recent AI advancement in natural language processing, such as LLM, as both a gap in research in this domain and an opportunity for future student counseling system design and development.

Most counseling systems use the desktop Web interface to provide counseling services (67%) and use submission feedback (71%) as a form of interaction. There are a few recently proposed systems using mobile only (20%) or a combination of desktop Web and Mobile devices (13%) for access and providing conversational counseling services (29%).

In summary, considering the prevalence of counseling needs by students nationwide, the research on counseling systems that would support or substitute human counselors is less than adequate. This survey could be used as a reference to stimulate more research in this field.

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